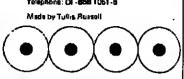
ASCOM Computer Tape

The ultimate any exertic tage. Superbiquely and reliability. Virtually unbreakable.

Boyden Oata Papers Limited 5 Commerce Way Wadden, Croydon CR9 4PN Telephone: 01 -858 1061 -6



NEWS IN BRIEF

Software for micros

THE first real time executive software to be developed by a microcomputer manufacturer for resident use on a micro has been released by Intel. Known aa RMX/80, it runs on Intel's 3080-based configurations.

number of utility routines such to console and analogue I/O drivers, and drivers for the hardware mathematics board, diskette controllers and the like.

European links

DEMAND from Holiand and Belgium for UK computer staff has led the staff recrultment firm John Goldamith Computer Services to forge closer links through working agreements with local companies. John Goidsmith's contact in Holland is a software and staffing comonny, Computer Service Evers. A link with Belgium is now being arranged.

Koreans accused

A RETIRED US lieutenant-colonel has accused top South Korean officials of stealing up to \$17 million worth of US aupplies a year since the early 1970s with the help of the US Army's Univac computer in Teegu.

FPS moves in

ARRAY processor manufactu-rer. Floating Point Systems, of Portland, Oregon, has opened and was originally developed for offices in Reading and Geneva the International Brotherhood to market its systems in Europe. FPS products include the AP-120B which can Interface with minicomputers and the for the software to ISC, before AP-190L for use with mainfra-

FLIGHT

International

200M

aircraft and sarvicaa.

5th Business &

Light Aviation

CRANFIELD AIRFIELD

BEDS, ENGLAND

SEPTEMBER 1-3

10 a.m. to 6 p.m.

Europe's leading maating dayoted axclusivaly to business

and ganeral evistion, with an international exhibition of

Entrance is free by registration ticket et the gate

Presented by Flight International . Outset Hopes, Stamford St., London SEI BLU

GE to enter packet switching business

THE Internetional time shering buresu General Electric is pisnning to become a common carrier affering packet switched effering packet switched network services. It is understood that the US company is elrosely prapering teriffs for submission to the government's Communications Commission.

US observers note that, as the biggest time sharing network in the US, GE could enter the packet switching business with

packet switching business with minimal investment. Sut they add that the company is likely to most apposition from other cerriers, such as Talenet, who could argue that GE is already too

GE is said to be convinced that its existing time sharing customers would be interested in the cost savings and reliability of a common carrier's network, and the company itself would probable to a major user.

No one at GE was evallable for comment se Computer Weskly went to press, and Honeywell, which markete GE's Mark III time shering network in Europe, said it had hoerd nothing of QE's

It is based on a modular, 2K byte block of code known as the Memory Resident Nucleus and a unbundles operating system

RELEASE of an enhanced transaction processing executive in the US shows Honeywell following the lead of IBM in unbundling software on the

fringe of its operating system.
The existing transaction executive, which will continue to be supported, is regarded as part of the GCOS operating system, and supplied free of charge. The new software, Transaction Process-Ing Executive-2, will be marketed as a separate, charged pro-

The situation is radically different from that of IBM's charged performance and accurity enhancements to its MVS and VM/370 operating systems, in that Transaction Processing Executive-2 was not produced within Honeywell. It comes from Information Systems Consultants, of Virginia, of Teamsters, the largest US trade union.

Honeywell pays a licence fee re-licensing it to users. It is thus faced with a continuing cost, rather than merely paying of the cost of a development.

UK release of the software is not yet scheduled, but in the US it will be available within the next three months for a \$35,000 single payment with an annual \$1,750 maintenance charge after the first year.

Transaction Processing Executive-2 is supplied for Level 66 and 6000 machines, and is claimed to be up to 50% more efficient than the existing GCOS software, os well as nilowing greater user interaction with the system at run-tline and providing more comprehensive statis-

The Honeywell move also highlights a growing trend among hardware manufacturers to acquire critical items of software from outside sources. Honeyweil already provides Cincom's Total database man agement system as a standard

Autumn boost for Eclipse

A MORE powerful version of the 500, is expected to be an nounced by the company in the autumn. It will come with a floating point processor and up to one Megabyte of mein memory, and will compete directly with the Digital Equipment PDP-11/70 and the interdata Megamini.

Klatu the robot

comes to town... KLATU came to town inst week and if all that is claimed for it (sorry, him, according to his maker), then the age of the robot

The robot is based on a microcomputer, the QIG, which

robot at the Ideal Home. Exhibition nt Olympin next Commented Ray Pny, hend of the NPL's speech recognition group, "If it can do what it is claimed, it is using technology of which we have no knowledge." And Dr Michael Lurennibe, of Warwick University and secre-

Data General Eclipse, the Model

Klatn, which la said to spenk, accept spoken orders and carry out "functions programmed by

Produced by Quasar Indus-

ries of New Jersey, Klutu flew

by British Alrwnys into Heath-

row on a transntluntic trip

ls Quaser's own design. The

compony has been in the SPA -

Sales Promotion Androld - field

for 10 years and hopes to have a

tary of the recently-funded

British Rnbot Association (CW.

July 28), expresaed surprise that

such an intelligent mochine

should cost only about \$4,000.

sponsored by the Dally Muil.

Holiday air strike vote

cantre have voter overwhelmingly to strike from today (August 25) until Monday in support of their pay damand of

ASSISTANT air traffic controllers and teleprintar operators at the West Drayton control 9020D air traffic control aystem from which flight progress data

is produced, During the go-slow, hand-written flight progress strips have been used.



No sxtre usage cherges

Availebia immediately Atlantic Computer Leasing Ltd. 27 Chancery Lana London WC2A INF

London, W.12 Tel: 01-743111 ONE OF THE MOST PROGRESS SOFTWARE HOUSE ICL offers

COMPUTER & MANAGEMENT

EDUCATION SERVE

21-25 Goldhawk B

productive Array for

AUREEMENT IN hern reached between letz five unions over a self-finar; productivity scheme, folio: a meeting last week.

According to ICL many director Geoffrey Cross & agreement is "well white; government's guidellane. a five per cent Phase Twod plus a self-financing probse . ty scheme which could are: in tenween 12 per cent at: per cent over 14 mon! depending on company to

The offer includes bonus mems of one per centions one per cent increase into ever, above the first lone increase in tumover, read that profits are at least the vien after payment of bone. Pro-tax profits in 1976 se alwait £23 million, compa with Elli million is 1975. The offer is being lookes

4.800 words and has a phonemefavourably by the me. Hydred. These are ASTACS FETPU, the TGWU, APEXE Phonemes are variations of IASS. They have recommend A domestic model planned for

acceptance of the offer by muss production will have a 8,1XX) ICL. Workers whose ful 250-word vocahalary and a reviewed each June. Meetings are being helds The offer is almost certain E) Vice-president of Quasar, Tony Reichelt told Computer Weekly that they hoped to be

Pilot PoS

accented.

POINT-OF-SALE equipment from ICI, has been lastalled a cash-and-curry depot in Wes ster as a pilot system warringr and Mason, a set sirie distribution division tolucco ginut Gallahar l KEY-TO-DISC equipment from system, comprising five Redfon Computers has been point-ni-suic terminals and 1501/40 computers, could be: Cirat of several order.

Warther and Mason by deputs around the country will prepare data for the ICL 1903T ran by Holton and Bury.

> THE LEADING TP MONITOR FOR ICL MACHINES

gets more out of your current nieching

*amouths the path to on-line systams

reengultion factor of 1,200

phoneme recognition factor of

turning out 120 androids a day in

n enoble of years. Tooling up is

now in prugress and Reichdii

said, "We hupe to meet denrand

in the US and the UK in 22

chosen by Hallon Metropolitum

Bureagh to replace ICL and Universard punches, the Sec-

check systom, with 14 forminals,

*has more than fifty users

Haar the rassons why at a

Bolton ohoice

the sounds of sneech.

* Carries you forward to your new machina directly to eme or to VME by TPS: CARE

Keep in the mainstroom of on-line systems

TECHNICAL PRESENTATION OXFORD, 6th SEPTEMBER

Write or telephone for your complimentary licket to TELECOMPUTING LIMITED Sasoourt Tower, West Way, Oxford (0866) 723621. Telex: 837276

Printed in Great Britain by Q.B. Limited, Silvepell Phys. C03 3LJ; end published by IPC Flectrose Estimated Derset Holize, Stanford Street London, SELSUIJ.



Number 565

Visit by Hong

Kong expert

HONG KONG expert on the

Chinese texts into English is to eddress a joint meeting of the

British Computer Society's netural lenguage translation specialist group and the Asso cistion for Literery and Linguistic Computers

cletion for Literary and Linguistic Computing.

The speaker will be Shiu-Cheng Loh, professor of computer science at the Chineso University of Hong Kong, Ha is visiting the UK to look at community of computers in use, se his department is expanding and mode its own medicine.

Professor Loh said the department was set un three years.

sertment was set up three your

ego, but is only starting to offer a degree course in the coming scedemic yeer. He is speing

a degree course in the corring scademic year. He is againg Digital Equipment, Data General and OEC minicomputers in action during his visit. Professor Loh will talk on the

computer translation of Chine scientific journels. The meeti

will be held on September 13 at 6pm at King's College in The Strand, London WC2. Non-members will be welcome.

THE release date for IBM'a real

time operating system for the Series I (CW, April 21) has been

brought forward, say US sources. The software could now

appear within the next month in

the US. The UK will presumably

receive the operating system in

Some prospective users in the

US have aiready seen the

operating system, and report

Thursday, September 1, 1977

Price 18p



FOR mare then 11 years, Computer Weekly hee consistently provided the most comprehensive end relieble reports on the computer industry. At the seins time, it

has been a pioneer in devo-loping specialist columns where readers can express

their opinions and learn about developments in their creas.

CW has been in Innovator in

introducing regular teatures for the software industry

(Softwere Flie); for program-mera (Programmer Noise); for ueera (User Forum) end universities (University

Now Compuler Weekly is

going from elrength to alrength, with lie growing

end of new contributors

such es Prolesaor Donald Michie and Tom Gilb to join

Georga Coger, Frad Lamond and the experienced GW teem.

The £5 interrupt

On page 2 livere is a new

feature called Interrupt - a

Irue story modern Aesops Fable, each with a moral-to be

learnt. And £5 will be paid for eny published interrupt sent

Othello the

More Game

Othello you will went to pley i

nore end moro. See page 11

Calculator

offer-page 3

CONTRACTOR OF THE TAX SELECTION OF THE PARTY SELECTION OF THE PARTY

lor our special oller.

Once you have tried playing

Round).

Briefing

1100 series

FOR high speed mathematical and scientific computation on 1100 series mainframes Univac now offers a floating point array processor. This is the AP-190L manufactured in the US by Floating Point Systems Inc of Portland, Oregon, the firm that has just opened sales offices no sending and Geneva (CW, Au-

The AP-190L can operate via one I/O channel pair from the host central processor and Univac says that conversion from its 36-bit format to the 3E-bit format of the AP-190L is handled by the 1100's channel interface. application areas for the array processor include aeismic and weather modelling, image pro-cessing, structural analysis and

Harris prices cut

IN response to the IBM 3270 price reductions of about 16% announced earlier this year (CW, May 26), Herris Systems, formerly Sanders Data Systems, as lowered the prices of its \$170 and 8180 interactive display terminals systems to between 10% and 22% below IBM. Harris says that a three-yeor lease agreement on an 8170 system. for exuniple, is now 20% less than the equivalent 3270 instal-

NCR strike

PRODUCTION of terminal equipment at NCR's Miamisburg. Ohio, plant has been hit by a strike of more than 800 roduction and service workers. but senior staff are continuing production of the microcircuit which are used in NCR's terminal range

L9000s go North

TO handle details of rent and rates collection, pnyroll, costing and creditors ledger, the Western Isles Council at Stornaway on Lewis, has installed two Burroughs L 9000 systems at a cost of £25,000.

Fujitsu chips

ADDITIONS to the Fujitsu trange of microcomputers has made the company second only lo Nippon Electric in Japanese mlcrocomputing capabilities. fulltsu has introduced a aingle , 4-bit micro and a two chip, soll system, the fatter baing compatible with the Motorola MC 6302 device. These additions are expected to double Fujitsu'a computer output.

FIL 6 at Computel THE FTL6 programming lan-page, developed by the NCC Fomits Filatob file meint enance

Ballantine's Day The Hedsor Perk conference on "Con computers save Britain?" has become a focal point for activities oftware, is now available from mputel on its ICL 1904S. The strong is also examining the linelensed 2900 implementation within the computer community to analyse and respond to the chellanging Issues of how information technology will affect ecclety. Melcoim Bellentine, a lecturer in ergonomics and the effects of computers on the best of computers on the second section. the language for use on its riad in Guildford nputers on worh, read Computer

Workly's reports on Hedder end this week provides his own contribution to the continuing NEW office has been opened software house Triad Com-

dabate.

Poor old Harpy

Readed 'by Dr Keith

Renzie It witt help servica

Harpy to a speech understanding

renearch project, which was fundad by the US Defence Depart-

Software on TV with Oracle interface chips for this application and samples of these are The Oracle board expects to awaited from the company's expand the service to about 350 laboratory. The decoder is expected to be announced some pages when access time prob-lems have been cured. Delays

time next year.

of its rivais.

Later GIM hopes to be able to

upgrade the decoder by use of

the CP 1600 16-bit micro, which

would enable other applications

to be handled. GIM also believes

that the use of a micro will make

Telesoftware will not be ready

for October 1, when the Oracle service goes live. Oracle will be

run between 0.30 nm and 10,30

pm seven days a week. Initially

yourself computers by means of the Oracle teletext service which Independent Television is planning to introduce on October 1. The memory in the Druck signal. decoder would act as a random

An iBA team is working on this possibility, which was sug-gested by Will Overington and described by him in a letter to Computer Weekly (CW, September 30, 1976).

"it's an interesting idea and has some very excling possibl-lities," said John Hedger, part of the tenm evaluating Telesoftware, as It is called. "It could be n way of linking teletext with the booming home computing

Hedger said the software would be transmitted as teletext characters, loaded into the decoder memory at the relevision receiver and accessed by a microcomputer linked to the

The plans of one of the threa companies alming to join Texas instruments in the market for Teletext and Viewdata decoders are particularly significant in the context of Telesoftware.

The company, General Instrument Microelectronics has adopted a radically different approach from TI, GEC and Mullard, It is using the GIM PIC 1650 eight-bit microcomputer in

also reported to be limited

relaase date could be obtained

The disc capacity of Seriea 1

aystems is expected to be boost-

from IBM in the UK.

Enhancements to Series 1 expected from IBM soon

DG expands 128 Kbyte capacity. No configuration of likely

home state of Messachusatts, Data General is to expand its plant at Westbrook, Maina, where processors and pariphaed early next year with the raia are easembled. When Its Introduction of an 80 Megabyte other naw plant at Clayton, North Carolina, le completed (CW, Octobar 28, 1976), and both aubsystem based on Winchester that it auffers from the usual IBM drawback of larga core occupancy. Addressability of for use with the Series I has a Data General will be employing

Computerview on user power:

Focus on price war Booth challenged on ESA order

Software File Programmer Notes Microprocessor News

Diary dates Novas for rocket tests

People in the Nawe

APPOINTMENTS

PAGES 15-30

OMPUTER WEEKLY'S INSIDE NEWS

ment's Arpa egoncy. But it made e cardinel mistake: It met ite research

core by the operating system is capacity of 9.3 Megabytes.

objectives and lost Arpa backing.
Professor Donald Michie gives his
private view on the mysterious
machinetions of research petrons.
Page 6 Liverpool 2 Chad OK Computer wins football league.
That is not merely the faintesy of one of Computer Weekly's faotball-crazy writers. Downtime's Chad orgisins why.

Laser musical

Leser beams ond holographic memories could make an important impact on computer memory technology in the future. Stave Shirley reports:

the problems by repeating the its decoder cheaper than those more popular pages, such as the Indexes, in the cycle, and by The introduction of Telesoftware as a service will depend on using blank space in the TV sig-

in coused by the fact that the

cycle of pages is scanned when a

page is chosen, so there can be a

long wait if the selected page has

just passed when the user

The Oracle team hopes to cure

co-operation from microcompoter manufacturers, on the As for demand for the service. Home Office ngreeing to the scrvice, and on whether the inmate that 12,000 sets will be dependent Broadcasting Authority considered it a vinble receiving Oracle by the end of the year, 62,000 in 1978 and 270,000 by 1979.

• Three reports, Teletext and Viewdata, Homecomputer, and Video Gomes, are available from MackIntoch Consultants, Victu-250 pages of information, rla House, Victoria Street, Luton including home and interna- LUI 5DH. They cost £430, £550 tional news, sport news, finan- and £490 respectively.

remote computer, to provide

access to a remote computer, to

provide access to a theoretically

inlimited amount of data.

Viewdata was demonstrated at

tho International Radio and TV

Show in Berlin lost month.

West German PTT buys rights in Viewdata

THE British lend in the use of the set via the telephone system to a domestic television set for the lisplay of textual informution is emphasised by the fact that, after three months of trials with a GEC 4080 minicomputer (CWI, June 9), the West German PTT authority has decided to buy rights in the Post Office's Viewdata software and experti-

Vlewdata links the talevision

meaning that users will not be able to utiliae the machine's full

BECAUSE of high taxation in its

reduce headaches with Marcol's 1900/2900 **Software Products** and Services 2900 TRANSITION

Save money —

Our 2900 Softwere & Services help you to make transitions fester and more cost effectively, while crediting a higher level of morals among your own stall. Here are some erese where, this superb new machine needs specialist support, not normally evalls bit from ICL — MARCOL can supply this support.

1900 OPTIMISATION

If you are not yet ready to move to 2900 for whatever reason — we can help you to cut beok divertised improve program efficiency, and reduce system run-times, which extends the life of your current equipment and maximises aveilable 2900 times under D.M.E.

Cell the 1900/2900 experts — Cell Marcol Software Products & Salvices Division, 60 (lueens Gardens, London, W.Z. Telephone 01:402 9366)





COMPUTER WEEKLY

Vol. 23 No. 565 Thuraday, Septembar 1, 1977

Malcolm Poltu
Deputy Editer:
Tony Higgina
Assistant Editors: Tim Palmer John Kavenegh Stephen Bell Advertisement Meneger John A Godley Clear Ad Menaga: Mike White Publishing Pirector: Eric ickinger

IPC Electrical Electronic Press Ltd.

Do you qualify

own free copy?

if you work with compoters yes may be entitled to jobs the 76,000

reeders who receive Campuler

Weekly tree-of-charge each week.

Britain's leading campular publi-callen is sant free to the following

calegories in the UK and Eire esive

losagemeet services executives

Civil servents responsible for

computing Menagement/computer causal-

for your

Company directors

Company sacralaries

Leclurers and Inechars

Proprammers

Compular aalaamaa Field eagineers

Cueralere

. Dala erecessing mahagers

Systems es alysis/08M sificers

Te fied out if you quality for a free

weakly copy, write lar a reader-

ahip application card to the Controlled Circulation Coperiment

al IPC-Busiseas Press (Ssies &

Distribution) Ltd. 40 Bowling Dream

Subscriptions isr readers outside

the shave estensiles are es inflows: One year. UK and oversees

£14.50. US end Canada \$37.70.

Siadaels. UK and Oversean 27.30. US and Conada Sis.80. Airmail

Subscripiiss regsesie ehauld be aani le: IPC Busicesa Press (Seles-

Perrymousi Reed, Haywards Hesth. Sussex RH16 3DH. Tel: 0444

& Distribution) Ltd. Dakilold Hsu

Circulation ingairies: Applications for resderable, sub-

scriptices and changes at address are dealt with at the addresses

llated above. To exacte regular delivery si Computer Weekly

readers who wish its paper is be

seal to a naw address should esail

label bearisy the serial number to

Sack sumbers can be had sa

the appropriete dapartment.

svaliable, for 40p psat fres.

Circulation: 78,685 with

the highest fully requests a circulation in the UK.

nlernafional Edition (10

issues a year) Circulation 95,218 (UK 76,081, Int

ISSN:0010-4787

Lane, Lasden ECIR ONE.

Two recent initiatives should Dorset House, Stamford Stree therefore be seized upon by all users — the Data Processing London, 8£1 9LU. Telephone: 01-281 8000 Telegrems/Telex: Management Association survey of user opinion on the Post 25137 BISPR8 G Oversees Cables: Comweel Bisnespres LDN SE1 Office (CW, August 4) and the EEC call for user groups to ensure that their names and Brench Offices: Bliminghem 202 Lynton House, addresses are on the EEC's files to assist in proper consultation Welsell Roed. 8irminghem 22B Tolephone: 021-356 4838 Menchester: Stelham House, Talbot Road, in the future (CW, August 25). Within the next weeks many users will be receiving the DPMA questionnaires which have been drawn up by Langton

Streiford, Manchester M32 Telephone: 061-872 4211 New York: Information Systems Ltd. as an enlightened response to a re-205 East 42nd Street, New York NY 10017
Telephone: (212) 887-2080
Published weekly on Thursday
Registored et the Post Office as e quest by the Carter review committee on the Post Office to comment on their recent report. Instead of merely providing a critique by a select group of

sociation has chosen to aeek the computer community at large. By contributing to this survey, it is unlikely that eny one user, or even all users together, can have a major immediate impact

on Post Office. help to pinpoint the DP users

The questions cover a wide range of lopics: the use of electronic mell, external databases. Vlewdata, and the effects of communications costs.

As the DPMA says in the covering letter, "The question-Information which is covered adequately in other surveys, but trying to get any kind of smooth data flow.

to shape their future THE lack of a forceful and groups ee possible to respond to a call by the EEC for user unified user voice has been a group names and addressas for their files, and to the DPMA misjor industry failure for so survey on user reaction to the Certer Committee on the Post long that no opportunity to unite should be missed.

Users can act now

Usar groups should sand datella to the Commission of the European Communifias, DG III/B/2, attention Mr Gerric, 200 rua de la Loi, B-1049 Brueesta, Belgium.

Users who ere not members of the DPMA end who would

ilke to receive copies of the quaetionneire abould contect the DPMA et 27A York Road, Meidenhaed, Berkehlre SL6 1SQ. Telephone: 0628 29676.

sions could be made by govern-

Filling in the DPMA or

with some hope to the EEC's call

This concept should also be

THE current industry price-cut-

ting rage is gathering momen-

tum. Few weeks seem to go by

without details of fresh unre-

peatable offers. Last week was

that "DiY" computing kits were

oining the price-cutting club

The fact that there was scope

cular area may well have come

ns n surprise to DP professionals.

many uf whom were under the

delusion that prices were

As for mainframe computers

the price-cutting cycle appears

to operate in a well structured

mode: Following iBM's price-

cutting exercise. Telex and Itel

lose little time in nanouncing

their lower prices. This opera-

tion is quickly followed by news

of yet anuther impending Ju-

punese computer invusion of the

US and Europe. Almost Incyltu-

prices. Telex and Itel mennwhile

do not lag far behind in muking

By now the industry ahould be

reveiling in the cut-throat com-

petition. DPMs should be eva-

reducing prices in this parti-

(CW, August 25).

already minimai.

exception, bringing news

FOCUS

for user consultation.

DPMA members."

The DPMA would, however, ment, manufacturers or user like to receive the views of as departments that will affect many users as possible, whether or not they are DPMA members, The EEC request for user contacting the EEC are two groups' names and addresses is simple ways of users taking up particularly significant because the opportunity to get involved it is almed at laying the In the decision-making process. foundation for bringing about the creation of a united Euro-Further action should follow and one looks, in particular, pean user voice.

ed to ensure that the user voice is heard more in the development of strategles relating to the computer industry and would views of its members and the like to see a single, united user

There are major hurdles to be overcome before such a body can be set up. And the prime one is that users, like most people tend to be concerned with their But at least the survey will own immediate self-interest

That is why most user group are manufacturers-based and are aimed primarily et parochial (elbelt important) manufacturers - dependent problems.

It is difficult to get a user to take action over an apparently nebulous Issue like electronic mail or international data flows, when so much time is spent on

But unless the DP user takes mation systems thinking of some unified action aoon, deci-

compater toles, cloaked in snonymity to protect the guilty and the innocent, with a morel to be learnt. For any published fable from a roader, Computer Weekly will pay £5. The first few fables have been contribated by Peter Williams, a computer men in the City. And here is his first tale:

controlled by a minicomputer. All the ingredients for the output of the mill, were supervised by the computer.

night shift, the mill started to alve rubbish by the mill. produce material which bore no resemblance to that which was required. So the computer support team sat down to debug the machine-code program — all 16K of It. No bug was found.

They were saved from complete despair by the senior programmer, who wandered

ONCE upon a time there was a Into the mechine room nt about steel mill which was completely 3 nm. There he discovered the operators hard at work. And, All the ingredients for the different types of steel and the sustenance, they had been over to the all night canteen and had rised by the computer.

The system, programmed in sandwiches. Which led to grease machine code, worked perfectly on the input paper tape, which

Grease in, garbage out, you might say. And the moral of this story ie: Do not let your operators eat bacon sandwiches (or anything aimilar) in the machine room. Or you might end up with a load of plg iron or something else you don't need, like trouble.

Open and above board price incentives are new to the Industry. Not so long ago, computer managers rather than the company cash flow were the salesman's target. The DPM in the market for a new machine was encouraged to visit e aimilar configuration in down-town Hamburg or Amsterdam - and here it wasn't aciely the attri-butes of the machine system which was revealed. Potential purchasars of per-haps less costly systems would

be invited to visit the manufacturing plant. An odd hour or so in the fectory, followed by a visit to the Scottlsh Highlande, worked wondars for the anles graphs. Very often thase "away-days" were more than a purchasing fringe benefit, They enabled the installation and sales team to get to know each other - a raistionship thet could be of critical importanca-for the future wellbeing of the

view of what is meant by user, he terms of this Computerview, so for, "user" has been taken to mean the DP department, But there are other users, known variously as the end user, the user department, or, as was horribly coined at 1140 last month, the "usee."

With the advent of minis and micrus, the end oser is increasingly becoming a direct computer user. And, after oil, the computer system is there to meet the end-user's needs

It is perhaps too premature to start asking for a united end user voice, when it is so difficult to get even the DP users together.

But in any discussion about users and user power, nobody should ever forget that the real power ultimately lies outside the

> ... on the industry's price-cutting war

Mnny DP managers must wonder what the price-cutting excitement is all about. In the past, price-cutting was probably fur more flexible. Salesmen had many subtle methods of reducing costs for the purchaser, it was not necessarily the lowest price witch offered the best deal. Costings from several manufacturers could be compatible for a proposed new configurution. But it was the after-

sides service which was the key to the DPM's final decision. An offer of a fattr-man project team to mustermind the converslon mutines could well trump the promise of free unlimited testing time or the two month In-house assignment of a tele-

comms expert. Even now, prices are often a great unknown. Salesmen may surreptitionally consult a price guide book, probably to determino how much they can charge bly, IBM takes up the cindlenge in specific circumstances, Mauand establishes new, inwer ufacturers guard their price

levels were seldon 4: influence on the purts the needs of the come; was reasonably compet price, then the contract be signed in any case, the ivas often disguised mit leasing or renting forme With current prices to almost as fast as minter

given to the cost of hard

is expended on cost of

of media. At least, the

future product developed

years

COMPUTER WEERL

AUGUST 31, 1967

THE English Bettel

tion" at the lower miles

IANGO and the windows
System 4/10 without b
officially announced.
E3900 family was abus

Burroughs range, but with the smallest EMA the lergest, E3900. On announced the P203 16 version of the Program decktop computer. See 10-year actions to make PAYE records for 22 at taxpayers and included

Laxpayers got under mit Inland Revenus Suil le

tion forecast religions computer centres was led in "unattractive famous erces"... The first re

plotting evallable tivide mercial time theirs in

was provided by the Electric . . . An English be

4/70 computer was body the work done by a cook

four machines, an IN 13. 360/30 and 1401, mast

Maroury, at the UK in Energy Authority...Com ences to 37 Shakesperis

University Computes to KDFO and published by

in the UK in the next few weeks. The system, called MSB-11, is aimed at secondary schools in sules are rising, price ka have a more significathe US but the main market in the UK will be "technical Renting a micro system: under £10,000 would b colleges upwards," according to DEC. The price of about £17,000 justify the monthly includes a 32K PDP-11/40 with This new found price ness is to be welcomed in us much scrutiny wilk!

Basic and Fortran A BASIC and Fortran system chps matrix printer, a mark sensing card reader, a terminal and Basic and Fortren langua-

education market by Digital Equipment. The system, already launched in the US is expected The company says the new mark sensing card reader will make the machine especially altractive to colleges which cannot afford card punches.

Another key feature, says the company, is that the user can either run four Interactive Basic terminals or run a fast-turnround baich stream with both

Sharp has never been a

conformist IBM user: in 1675,

positions with two column print, room rate louk-up turnover figures for particular departments and a cassette recording

looking for up to three times

better throughput at about the

same cost as the 145s (CW,

The operating system used by Sharp is based on version 27 of DOS with several in-house

enhancements. The Power

spooling packaga, also anhancad

• The North-aast Florida

ville hae replaced its IBM

370/168 with an Amdahi 470V/6

which is to run under OS/MVI

and use the Hasp communica

tions package. The machines will be used for the full range of

educational applications by the

Universities of Florida and of

In the early 1970s, Memorex

October 2, 1676).

in-house, is used.

North Florida

Ten Minister challenged over ESA orders

THE row over the Employment Services Agency orders for US minicomputer equipment (CW. August 11) continues with the news that John Wakehsm, the Conservative MP for Maldon, Essex - has written to Employment Secretary Albert Booth

. This follows the strong attack on the ESA and on the Central

Computer Agency by another MP, Eric Moonman (Lab, Basildon) who described the decision to buy US equipment for the job vacnicy message switching systems instead of UK-built kit from Digico as "uppalling."

Moonman has already been in

touch with Booth asking him to intervene.

The Department of Employ-

Testing the 'obedience' of average motorist

te the teck of any direct control ever the motorist. Although otorway systems after the propriet a wide range of instructions through the road signs, there is nothing to compel the otoriet to obev.

Now, the Transport and Road Research Laboratory has placed a contract with the Golden River Company of Bicester for micro-processor-based vehicle classiftation equipment that will be sed to study the degree of bedience in the everage motor-

The Golden River system will provide information on vehicle speed, specing and lene grouping for a 10 km stratch of motorwey following a set of illumineted igns. In this way, the pattern of

DEC system to teach

based un the PDP-11 minlcom-

puter is being introduced to the

Inductive loops in the road can be classified into 24 knewn and als Unknown groupings renging from privete cars up to heavy fixed and eniculated lorries. This is cerried out by a program developed by Golden River, based on date extracted from menufecturers'

The system is based on the RCA 1802 microprocessor work-ing with BEK of mamory cons-tructed in 4K, UV erosable PROM blocks. It is moduler in constru tion, with the processor capel of operating with a veriety of monitoring units made by the

between £1,500 end £2,000, depending on softwere, which is equivalent to performing a menual traffic clessification for one

Hotel Poster

INTRODUCED by NCR is the 250-8000 Holel Poster, which gives front office control over hotel transactions, from udvance bookings to gift shop

meni has acknowledged receipt of the complaints from both MPs

but as yet is unable to comment

Wnkeham Iolil Computer

Weckly that he did not regard

the issue as party political and

said that he would probably

ilaise with Moonman as it

He believed that if the matter

was not resolved by the time

Parliament reconvened at the

end of October questions could

copy of the Computer Weekly

story about the ESA orders,

together with a letter pointing

out that, while he was not an

expert on the computer Indus-

try, he would be interested in

So far the Employment Servi-

message switching systems for

disseminating job vacancy de-talla among Job Centres. These

are to be installed in London and

Glasgow and, in both cases, the supplier chosen was Interdata.

The equipment ordered includes

about 100 US built daisy wheel

Digico's unsuccessful tenders

included matrix printer termi-nals manufactured in the UK by Drico and Trend as well as its

own Micro 16E minicomputers.

for about 10 more conurbations

could be ordered by the ESA -

the next two probably being Newcastle and Liverpool. Digico

intends to bid for these con-

Message switching systems

Wakeham has sent Booth a

be asked in the House.

Booth's comments.

printer terminals.

It has programmable print

MEET the ideas men . . . Ken Bruce from the production engineering department at Heneywall's Newhouse factory, Strathclyde, is seen ted ete mechine he designed for prodecing pre-fermed components for sted circuit essemblies. He has also won a prize for a new method fer improving the yield an acidered circuit boards. Stace's ideas were pat farward ander the factory's cost improvement programme and were mach appraciated by the technical operations manager Tom Frame (centro) and George McNell, director of Newhoase compater operations.

GEC wins minis order

ces Agency has ordered two THE order for minicomputers to replace the 10-year-old IBM delivered during the 1877-78 mainframe at London's University College has gone to the UK manufacturer GEC. The other companies competing for have been worked out yet but the order were Prime and Digital the college has said that the Equipment (CW, August 4).

academic year and another two or three will probably be added later. No configuration details

Extras for Olympia machines

NOW available as optional extres for Olympia Business Machines SGE 65 and SGE 65C typewriters are a decimal tabulator, micro typestyle, Arabic script and a 24 inch carriage,

The ten-key tabulator is said to be a time saver for the typist when it comes to financial/accountancy listings or form filling. it costs £49 plus VAT.

Of interest to those who wish to obtain the maximum amount

of typing on a single sheet, the micro type, said to be the first available to the new international standard, gives 15 letters per inch and costs £46 plus VAT. Reflecting the growth in the

export market to the Middle East, Olympia has also introduced Arabic script, while wider jobs can now be handled with a new 24 Inch carriage. Respective prices are £72.50 and £221 (on

Cassette terminal introduced

A MICROPROCESSOR-contrulled cassette terminal, manufactured by the MFE Corp of New Hampshire has been introduced into the UK by Data Dynamics.

The MFE 5000 terminal uses the micro to control the cassette transport and implement a commands to the system. Ir addition to forcing the operator to perform only legal operation nal sequences, it also limple ments all the internal selfchecking.

interfacing can be either CCITT V24 or TTY current loop, with communications rate switch selectable to any of aix speeda from 110 to 2400 baud. Cheracter length is 11 bits at 110 baud and 10 bits at all other speeds, and transmission can be either half or full duplex using asynchronous serial bit-by-bl characters.

Operator controls are providd for read, write, initialise, fast forward, rewind, auto-program aearch and edit. In addition there are 13 remote control functiona implemented in ASCII control characters.

Intel-Timex watch contract

TIMEX has signed a contract with intel for the developmen of a liquid crystni watch.

speculotion in the US that intel is preparing to withdraw from the finished watch manufacturing business, the province of its Microma subsidiary.

Miniterm 1203 from Teleprinter Equipment

Computing power from a briefcase



valculator offer

COMPUTER WEEKLY OFFER Please send me ..., Taxas Instrument TI-Programmer hexadecimel and posterior at the special Computer Weakly price of £45.38 (inc VAT IPC Strainess Brace & Chaque/PO to the value of made payable to

b: LPC Business Press Speciel Offera, Room 1305, Surrey House, Sutton, Surrey.

tried to challenge IBM with a pair of medium scale mainframes aimed at IBM's amalier 370s. That attempt was aban-

> deliveries were made to the Bell Talephone Company of Penn-sylvania, Burlington Northern Railroad and Exxon Corp, which trades under the Esso pama in

with systems going to two as yet unnamed dustomers

Sharp 'defects' to Amdahl LATEST "blue chip" 1BM custo these quite soon.

price-cutting war is not DP installations are jurg mer to defect to Amdalıl is the international APL time sharing bureau I.P. Sharp. The Toronto-based bureau at present uses two IBM 360/75s, but in Sep-tember will Install an Amdahl

the company, at that time using two 370/145a, considered enhancing its installation with a Burroughs B6700, in the end it decided to upgrade in reverse By making the switch to the

Due to an administrative error the special price for the Texas instruments. Tt-programmer calculator was given incorrectly least week. All orders received in response to that extractions and the servertisement ap to first post price. Friday, Seplember 2, will be bottomed. The calculator is now offered at the special price of the shown.

doned, but Memorex is support ing Amdahl by replacing its two 370/155s with a 470V/6... Other recent Amdahi 470

Europe First deliveries of the smaller 470V/5 are to begin next month

KNIGHT PROGRAMMING SUPPORT THE ORIGINAL KNIGHT CONTRACT

Successful Software Support Specialists since 1970 in the UK and abroad

PROGRAMMING TEAM

27 NOEL STREET, LONDON, W.1 - 01-437 2154

BRITISH EQUIPMENT To start with, it will run alongside the two 360s; but by make PAPER TAPE & 80 COLUMN CARD PUNCS. Sherp plans to phase out one of Burrough decided it and replative 360s. By make luating between taking advantage of the current Honeywell offer, or hanging on for a week PRINTING PUNCHES, CARD SORTERS or so for NCR's latest competi-INTERPRETERS

Country-wide service organisation Purchase, rental or leasing terms

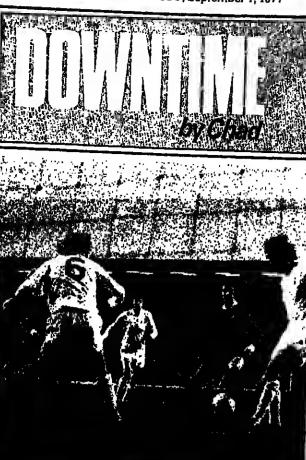
16a Limes Road, Croydon Telephone: 01-689 6537

* VT62 with 1920 upper end lower case the policy of the direct case the direct c direct cuser edd/essing and numeric function ped VT60 with 950 upper case character (12 × 60) screen.

 Both feature full cursor controls, unique held soled page scrolling and individually evillable received from 75 to 9800 band.

For rapid delivery of the Descape range of video ten

30 NEAL'STREET LONDON WOHOW RECHARGE



Computer-influenced Liverpool in winning form.

Why 'the Reds' are off to a good start

IF Liverpool wins the Football Leagua championship again this season it might be because the teem paid £400,000 for Kenny Daiglish in the sum-mer. Or perheps because Steve Heighway in particular has reportedly started the season

But whatever effect individual players have on the team's fortunes, the Fuotball League's computerised fixture selection system is likely to be one of the most important

For it is this system—run by a bureau which prefers to remain anonymous for fear of being flooded with requests for fixture details—which draws up fixtures for the 92 league clubs, in four divisions.

And the system has already helped "the Reds" at Liverpool gct off to a good start by giving the team two relatively easy first home games against Vewcastle United and West Bromwich Albion, saving likaly championship contenders such as Manchester United nnd Ipswich Town for later.

The Football League started to compile the fixtures by computer about 12 years sgo merely to speed up tha process, said Alan Hardaker, general

secretary.
"Before that they were preared by a full-time member of the Football League staff and two assistants using a copyright formula. After consid ole preparatory work, the actual compilation took shout two weeks. The preparatory work still hos to be carried out by Football Leogue staff, but the compilation is much

And we've got Orient just down the road," The preparatory work first division or gets promoted this season, don't put it down includes ensuring as far as possible that teams playing away at Christmas and Easter merely to them being o great bunch of lads, or believa do not have to travel too far. Jimmy Hill'a claims about that Each team can name one other 89th-minute penalty on a muddy November evening being the turning point.
Ramember that computer. team it does not want to clash with on home gamea, and this too is taken Into secount at the input preparation stage.

The Leagua also tries to ensure that fixtures are not played in the same order as the

"Nestran performed all the electic analysis for the US space programme", seys a presa release on NASA's structurel analysis suits. I'd elweys suspected that some of these rockets were driven by rubber bands. The computer aystem produces individual club fixture

lists and a chronological list of all fixtures. The lists are sent to clubs for comments and

ple, is at Rochdale.

having to travel to Working-

ton for mld-week evening

London is one of the most

So when your team wins tha

requests for changes are mad wnere possible. The preparation of data for a season's fixtures starts in the previous March or April. The ixtures bave to be ready well in advance so that clubs and other organisations can prepare season tickets, sdvertise ments, pools coupons and so

newcomer this year, Wimble don, in south London, hos had to accept fixtures prepared for the club it replaced. Working ton, 270 miles to the north, Cumbria. This bas givar Wimbledon s lot of travelling al Easter and Christmas according to club chairman Ron Noades. One of its away

games at Christmas, for exsm Even well-established clubs cut off our decision-mokers from the information they need do not always get their own way. Bobby Roberts, msnager of Colcheater United, bemoaned the fact that his team had to travel to Burn or and, to use the anniogy, to proceed to design a motorway network in terms of carburattor team had to travel to Bury on settings and exhaust design. It isn't going to work.

People at large must become December 27 after s home game the day before, and Bill Dodgin at Brentford recalled

congested areas as far as football clubs are concerned, as West Ham secretary Edwin "We ask for our games not to clash with those of Spurs," he said. "But then Spurs don't wont to clash with Arsenal."

Guide to electronics firms in Europe

A SECOND edition of the guide to suppliers of electronic equipment and componenta throughout Europe is now available. Produced in English, French and Garman, the directory, European Electronics Suppliers Guida, gives details of 2,800 companies, including many in Eastern Europe. In addition to datails of products; some manufacturers have also given aver facturers have also given syn-opses of their manufacturing

programmes. The products are grouped into

etc, as well as apeciolised fialds such as banking, education, defance, aviation, transport and office administration. There is also a section on US companies operating in Europe...

The guide is published by Variog für Wirtschaftsilteratur of Zurich, and C. G. Wedgwood of London, Copias are available from Ganeral Sales Dept (CW), Room 11, IPC Electrical-Elecprogrammes.

The products are grouped into chapters covering communications, computars, materiols, production equipment, cables, left elsewhere.

One of the people wite respectful Birkbeck Collage, Landon For Hare Ballantine explaints organised by Computer Weeky and to the Computer Weekly Call for organised by Computer Weeky end to the Computer vyeukly the British chepter of the ACM, entified Can Computers Seve Britein?

Action to define apport such in bolinvloural scientist policy was Malcolm Ballantine, who intend of intended intended society as a subtence of the Computer vyeukly to the Computer vyeukly that is intended in the computer vyeukly that is in entified Can Computers Seve Britain poncy will immediate the control of computers on ergonomica and the offocts society as a subject of computers of work for the Doppet. the move for the esteblishment of a clear policy for computing in the UK.

clear policy for computing in the UK.

clear policy for computing in the UK.

How can 'non-workers' be educated?

call for an overall policy on the Introduction and application of computers in the UK roises another problem. How can we make the ever-increasing number of computers in our midst mora amenable to people? Once again we are faced with

The recent Hedsor Perk conference

the complexities which make the problem so difficult to solve. As a behavioural scientist who has been professionally concerned with these mattars for soma years, I would like to add my point of view to the debate.

On the surface, at least, there is an immediate problem to be overcome. Many people find compulers difficult to understand and are further discouraged from trains to understand. raged from trying to understand them because of the difficult vocabulary used by those who

do understand tham. On the other hand, the effects of computing are probably aven more complax — and many of the issues which arise are not directly related to tha machines. Society as a whole must make the decisions which we will have to face in the immediate future, yet society as a whole is not at present able to make those

An analogy comes to mind, that of the internal combustion engine. In the days of horses we had roads and we had vehicles. In the lost 50 years we have seen from the development of roods and road transport systems one of the most obvious changes which the human roce has ever imposed on the surface of this planet. These changes have conie about because of the

internol combustion engine. We have always had communication systems and the checks ond controls which enable us to run our society. These are about to be transformed in a way which is at least equol to the changes we have seen in rood

And yet our approach to these problems seems at present to ignore the opinions of the vast misjority of ordinary people whn are offected by the chongas, to

more aware of the Impending changas. Computer professionals, in turn must be more open. help people to undarstand what is being done, and, above all, take a far less narrow view of the effects of whot they are

MALCOLM BALLANTINE - Computer professionals . . . must be more

altitudes. The unalysis is be-

From a homanitorian, and

democratic, point of view the

overall question to be answered here is "what do people want?"

Yel even the mechanisms for

fluding the answers are not

We can take a narrower

point-of-view and look at the

individuals in our society. What

sort of jobs will the "workers"

have? Will we nlinw technology to be the sole determinant of

tasks, from which jobs ore then

coming difficult to make.

statements like this, but they are only one man's opinions, and rificate the "workers" for their rapidly changing jobs? How do we oduente the "non workers" they beg more questions than they answer. Let us book a little for leisure? The young adults of decper. There seems little doubt that the most profound efforts the enrly 19:0s are in infants will, at least in the next 10 to 15 school now, yet many of them are getting an education fit for years, be on unr working lives.

In a brond sense, there are questions that need to be faced up tn hare. What should our employment (or unemployment) policy bc? Is 1110% employment our prining objec-tive? Or nre we capable of, and preparad for change that must utherwise take place in our attitudes towards unemploy-

To put that lust point in the most down-to-curth way; how quickly can we rid ourselves of the feeling that getting money without working is scrounging?

That is what any plan which

That is what any plan which does not accapt 100% employment as a goal implias. People will have to get as much money for doing nothing as for working. Where does that put our contemporary notions of motivation and incent

It is all very well making bold children need? How do we

tendency has been be us much as possible relinble than humang Very often the it. mooilor-chedir intervening only star ry. Total sulomatient ficult and the mit. that it will be many je

predominant locale

n paradox is appear

people can be replace

standard fenture. ses so does the level of ciency of the operan whole. Increase the inof the operator, so the

goes, and the efficient system as a whole intra There is an optimus than the maximum; The truth of this to

ver been previously [4] nlogy is not only those with power mi retain and increase that,

raised by the future dis

has not been reserveryone's satisfaction

industries where the m

said to occur, and yell

fur automation of job

have so far been litter

on a scale far wide t

gical development art-What is happening? thoing it? Who are the? Educational evaluation has traditionally thought in terms of for? Who is to gain? Wha necessary knowledge, skills and

thuse which are most he ignored by systems &

assombled? Or do we design Jobs and then adapt our technology



I he alternative to IBM.

213 Oxford St, London W1.01.78

TELEX

LETTERS

OP SPOT ... this week leaks back to the days when men wes meeter of the mechine — and the subsequent reversel of Always a problem to know what is required

article of Computers and Ac-countant (CW, August 18), has, in limited space, done well not

only to highlight the scope now

available to accountants to limit

today's drudgery but also the scope that could be available to

His comment, however, that

"it is extremely difficult to

determine the power and flexi-bility of such a system (general ledger) from the sales literature"

Perhaps there is some truth in

this but any system sdopted by such diverse organisations os Rank Xerox, the Stock Ex-

change, Massey Ferguson, Willis

Faher and London Transport must speak for itself, and per-

haps the real hugbenr is that some accountants and DP spe-

them to pioneer the future.

cnnnot go unanswered.

for the users to inform us of any

errors, and also to odvise us of

any recommendations they may

have for improving the publica-

In the last six months, despite

major software release, only

about 20 of thesc forms have

been returned. Because of this

low response we have recently

can be as all-embracing as the one they have developed and

then have to msintain them-

One can understand their dilenima, but it is a fact that

developments in packaged sys-

carried out an Inquiry, involving

OPERATING systems; who really wants them? Is ICL's George better than IBM's OS? Or vice-versa? manuals in Op Spot (CW, July 28) you state that "often they list Back in the "good" old days, when OS meant Ohl Sugar and GIS was still being

fail to show the actual Informaatched, operators had great fun. Console logs could be "doctored", and audit trails It is always a problem to know existed only in the outback. what is the required informa-The machine needed men tion, and what is irrelevant. The mochine was our slave particularly since no two users

How things have changed. Today, operators run around comment forms at the end of n ever-decreasing circles, each of our technical publica. country, to find out what users trying to obey the machine as

quickly as possible. How fast have the roles reversed? Nowadays, there of operators who think that he operating system is a vital part of the machine -

How many people have experienced both the IBM and ICL variants of operating systems? This must be conusing, for they have totally lifferent approaches.
It would be interesting t

hear from members of the computer froternity in general, and operations in parti-cular, of the problems encountered in using both

So, dig deep into your operating system and tell us about the problems — or anything else you care to remember. So long as it I

cinlists are unwilling to mimi

incerned themselve computing.

If we ore to progress the Issues with white start, There must be start, There must

carburet for setting the state of the consultance o Level 6 agreement COMMERCIAL transaction

COUPLERS

Discussing systems based on Honeywell Level 0 minicompulers are now being sold on a tumkcy basis by Computer Factors Ltd, of Coventry. Medium-sized firms currently using VRCs and big mainframe users to boking for small systems to noting for small systems to spindle specialised applications seen as the two main types of

Founded six years ago Computer Factors has about 400 customers with VRCs and has also sold nine General Automation TOM commarcial systems. Metems will complement TOM in its product range because OM can have no more than four VDU terminals, while Level can handla many more — in theory up to 56.

Under its contract with Hon-eywell's Minicomputer and Ter-minala Division CFL la also being supplied with a completa range of peripharals. CFL points out that all Honeywell hardware installed with its customers will be maintained by Honaywell's own field enginearing force. Applications software for

CFL's Level 6 cuatomers will be produced by another Coventry firm, Simdall, This is a software housa epecialising in small commercial systama which already works with CFL's TOM

Simdell will convert an exist-ing ranga of applications pack-ages already available in com-mercial Fortran for TOM, to Cobol 74 for Level 6. These will run under the GCOS 6 operating

Just one criticism

NCC's book "Plonning for Standby" in the Focus article on Independent power supplies (CW, August 4). In view of the It is our aim to provide our users with the documentation praise for the "otherwise admirthey require. Whenevar comable book" it may seem petty to ments ore received they are ilbe at the one criticism but, in fairness to the NCC Mambers' acted upon in the next revision, or if a significant omission or error is found, an addendum is Working Party who wrote the report, may I direct Focus to pages 35-39. He may have produced specially to remedy missed this chapter on his final reading but I feel that power supplies are given more than a mention, both in the text and in

the checklist. l was pleased Focus chose to bring this lesson of the New York situation home to British Solutions for the accountant

> user not only can plan his our positions. certainty but also knows his financial commitment ROY P. TAYLOR Chairman,

NCC Security Unit

readers. Security la so often

neglected until the misfortunss

of others lead us to safeguard

Scanners

COMPUTERISED medical X ray scanners can minre than haive the cost of diagnosing growths in the body and reduce the length of a patient's stay in bospital by 25%. These facts emerge from a study of nine US nospitals, carried out by EMI,

Tha study found that infor mation gained from scans eli minated the need for many other tests and in many cases made exploratory operationa unnecessary, thus cutting a patient's stay in hospital from 17 to 13

Average diagnosis costs were reduced from £3,000 to £1,120 for an abdominal growth end £3,700 to £2,000 for e pelvic growth.

£40,000 profits

PROFITS of £40,000 on a turn-over of £400,000 for the year to uly have been announced by Datapro, the data preparation bureau. Company expansion during the last year has included Edit 100 system at its Kingston branch with a 12-keystation ICL

Exciting things happen with Prime

Prime Computer helps design power cables and mix paints for heavy duty plant like this shovel. The contractor uses it to move thousands of tons for bridges and roads designed on his Prime computer. Prime's transaction processing has an exciting part to play connecting you to your business instantly.

Prime Computer (UK) Limited The Merion Certire, St Peier's Street, Bedford MK40 2PN and The Cosch House, 173 Sheen Lane, London SW14 BNA.
Telephone Redford 0284 6611 for London 01 # 78 4

PRIME

COMMENTAL BUILDING TO THE

MICHIE'S PRIVATEVIEW

The important thing is not to succeed...



SOME innncents might think that the patrons of a research project which met its objectives would be overloyed and ready to keep the cash flowing freely. But, as many who live by scientific patronage have found to their cost, patrons can move in mysterious ways.

Take, for example, the speech-understanding project, funded by the US Defence Department's Advanced Research Projects Agency,

It is remarkable enough that nf the half dozen or so laboratories which started off in 1971 chasing a \$3 million carrot and n list of impossible targets, one of thent, the Carnegie Mellon University, has not only consumed its share of the carrot (that's eosy) but has also actually done what it was

That, however, is a dangerous way to go with most research sponsors, for reasons to which I shall return.

First of all, let us take a closer look at Carnegle Mclion's venture, known as the Horpy Project. In 1971, 18 turget Items were specified by Arpa, including, for example, that the system should be able to necept connected speech that is phrases, not individual words — from five different speakers of the general Ameri-Can language, with modest interactive capabillies, and a 9% error rate.

It was apecified that it should cost about \$5 a sentence and operate on a 0,35 million instructions per second Digital Equipment PDP-10 with 256K words. A further Item was that it should be demonstrable with a moderate chance of success in 1976. And on August 13, 1976, Harpy did become operational, measuring up impressively to the 18 targeted items, over-fulling some and falling just a little

short on others. And what do you think Ama's response to this was? It immediately withdrew funding and further interest in the project. So what then moti-

vates a patron to unbelt? First and foremost he does so In the natural hope that something will be done to interest him, to stimulate his imagination - something to

if no definite goals have been agreed in advance, and in university-based research they very seldom are, the patron may suffer uneasy feelings at the time of launch; but the

project has little to fear. Since he has so little idea of what to expect, the patron is bound to be surprised at the outcome -- most of all if the research team reports no success at all: "Surprisingly the problem proved more difficult than anticipated. Substantial Increase in funding is needed to enable us adequately to probe the reasons for this." If a patron has steadfastly withheld support and the project rushes on to success, there is truly a surprisc.

But to say, as the Harpy team did, "We shall do thus and so, and from A we shall pass on to B and thence to C, marking off agreed milestones on their due dates, and in the fullness of time we shall attain to our grand objectives X on which we shall report to you, Sire, at length and in details."

Yawn, that is, in the face of Harpy's achievement, as described in the final report of

the Arpa ateening committee of scientific advisers which con-cluded: "In 1971, when the project started, perhaps the majority of informed technical opinion put general speech recognition by computers as not possible in the foreseeable future and perhaps not possible at all ... Informed technical opinion can now be that general cost-effective speech input to computers is an attainable goal ... It would go a long way

towards making computers easy to use and more accessible to the general non-technical public." The meeting will take place at the Royal Institution, Alhermarle Street, London, from As for the fina team at September 12 to 14. The citlef Carnegle Mellon, they should guest speaker at the conference have promised Arpa an underdinner will be Professor Maurice water robot and then produced a speech - understanding ma-

Wlikes, of Cambridge Universchine. Or vice versa. Elther Mumps was originally deveway, they'd be coining it now. loped by Massachusetts Unlversity for Digital Equipment minicomputers. The

system has since bean adopted to a voriety of other equipment, Professor Maurico Wilkos . . . and the coming meating will hear at laast two addresses on

THE growing European user group for the Mumps multi-

programming operating system

and language (CW, September 16, 1976) is to hold its second

annual meeting in the UK later

opplication to microprocessors.

Richord Walters, of Collifornia University will speak about a high-leval microprocessor implementation of Mumps almed at portability. This has already been implemented on intel 8080 and Digital LSI-11 micros.

A representative of the German company Grips, will present its own Grips system, a Mamps implementation on a network of subsequentinolorage Soparate processurs can handle separate functions, for Journal of Develo example, data manogement and progrum interpretation in parallel.

"workshop" discussion sessions, on such topics as "Mounts for managars." Fee is \$115 (£06) for members of the user group, \$140 (£80.50) for non-members, and an extra \$15 (£8.62) for the dinner. since 1073. The meeting will include a total of 25 papers, in midition to several still expected.

database meeting THE views of the only UK-based month, the committee's Codasyl committee are having a response to suggestions for a material influence on the form separate language describing of Codasyl's recommendations the storage organisation aspects for database management straof the database was finally settled

Result of Codasy

SOFTWARE FILE

vices, the DP subsidiary

of the National Freight

Corporation, for use on

FCS has already

Birmingham

Prof Wilkes for 2nd

Mumps conference

ngement + software its tioneywell 66/20 in

A PRESTIGIOUS initial user has been

Computer Services'

Filcon disc-space man-

20% cut in disc space thanks to Filcon

heen acquired by reported a 20% include binds.

Froidin Computer Ser. decrease in the disc Services Natural.

space required.

At a meeting of Codasyl's

Data Description Language
Committee in Minneapolis last

The basic outline of such a imaging will be included to the next issue of the ODLC's Jour-

appear early next res detailed syntax of the ba will be published not up the main report but appendix, bound in the

mired. riers, Freighter.
Company Pickfords, Th

supplies computer services to the Nathanai Freight Corporation's Enfeld hided

lobbies for this Oate &. Description Language 8 ing Group (OBAWG): group is jointly run by (c) and the BCS Advance); The presence of a Diffi-

Stockbrokers get WHAM A COMPUTER system based on make a major change to Codasy recommends two Data General Eclipse S200s, Sycor intelligent terminals or which have previous that enables atockbrokers to software programmed intelliobtain up-to-date information gent terminal clusters from circuited to a central si that included both da for trading is being offered by Wreden Holding Corp in the US. Wheeden Holding Corp has Called WHAM, Wheeden already invested \$700,000 in the organisation and storage: matlan, with surrow subsciremas describing to Holding Corporation Automatlua,000 transactions in a six

dual "views" of the datha The removal of the s aspects into a separate & tion leaves the schemat: only abstract organise. information. Thus the Ga organisation is begine; look increasingly like the gested by ANSI's Suc Planning and Requir Committee (Spare), wit separate "conceptual" c for information purely a lugical relations of data

Such a clear separati abstract and storage ocins been repeatedly and syl, the lutest example be: an uddress at the life of by G. M. Nijssen of Contre. (CW, August 25).

structured and modular proraniming standards and Indiidual installation standards. was decided not to pertit A product has been brought o our notice which draws all these threads together. In fact, in the light of the increasing popularity of structured pro-

gramming, its developers, Cy-borg Software Systems, has changed the name from Modular Programming System to Structured Programming Sysm, with appropriate changes n the software. Rather than talking nebu-

in the past few weeks, Pro-

grammer Notes has discussed

ne use of program generation

aids and the enforcement of

lously about the usefulness or adverse effects of such aida, it might be instructive to aet this package up as a "teat case", invite criticism of its specific approach. This could prove instructive as regards the acceptability of these tools. . SPS is claimed to have been devised as a result of a survey

of programming practice in many installutions. This thia really represent the proimplies that such a survey has entibled Cyborg to build up a general picture of desirable programmaing techniques.
There are obviously some

broad principles, such as topdown progromming and Modular structures, which have become generally accept-ed; but SPS, like many such products, lays down rules at a more detailed level. It stipulates, for example, that Cobol Modules should be controlled from ligher-ranking modules in the top two laveis in the module hierarchy are fixed; one "control level" supervising

plating acquiring one.

Speakers will come from a number of prominent database users, including Hawker Sidde-ley Aviation, British Airways

and Conmercial Union Assurance. Chairman will be David Firnberg, director of the Naarge IBM 370. Jional Computing Centre. Cost of the seminar is £80 plus VAT. Further details from designed for managers who Dorileen Culling at BIS.

Tradera can use cither

system and hos said that esti-

mates for establishing a similar

"central market" have been put

Set up Cyborg's structured

program system as test case

three "mnjor levels", which correspond to "initial", "Main" and "final" process-

incoterin.

PROGRAMMER NOTES

EDITED BY STEPHEN BELL

selection and implementation quirements were ambitious,

consultancy has been completed by Scicon for Petrobras, the Brazilian state oil corporation. Several US and continental including management of data on planning, personnel, materials requirements and purchasing, in addition to the main

consultancies are said to have business, the purchase of crude oil, its refinement and the sale of the products.

Learning to live with database

WITH the acceptance of the have a database, or are contem-

database concept, seminars on

the subject have tended away

from the theoretical and

towards alring of practical experience and consideration of

The latest event of this kind is

due to be held on September 22 at the Cafe Royal, London, and is sponsored by BIS Applied Systems. The seminar is

lay-to-day problems.

ing linear programming models The software selected was

generator.

The choice was severely narrowed by the availability of support in Brazil. The only reasonably supported software,

style, on an individual or gen-

eral basis? Do you find your

style has changed; and is it as n

ago. Following this, Scicon had to decide whether a conventional file or database system was more appropriate as a solution. Having decided on a database

pproach, selection of an appropriate database management system and associated software was the next stage. The human and machine resources available for the development then had to be assessed and a development

formed the first phase of the

project, which began two years

Petrobras is no newcomer to the DP scene, having had IBM hardware for some years. At present, the company operates a

The database unplementation thus had to be considered not only in its own right, but also in terms of its interaction with other complex software, includ-

based on Cincom's Total database management system, together with the same company's Environ/1 teleprocessing monitor and Socrates report

Scicon was one of the first

Some scepticism has been expressed in the past regarding Scicon's simultaneous activities as an independent database Cullinane's IDMS database soft-

The successful conclusion of a

Amending

AN interactive record amendment facility, using the standard ICL direct data entry terminals, is being developed by CRL-Abacus for its source library maintenance system for 2903a and 290 is, Ablih (CW, August

Data cait already be input

Details of Scicon's major order with Brazil oil firm own software. Cincom has its own office in Rio de Janeiro. handling the whole South

Following the selection, Scicon has been assisting with system has not yet been completed, Petrobras has now achieved a state of self-sufficiency allowing Scicon to terminate its involvement.

companies to specialise in database consultancy, an area since approached by many firms. The company claims to have developed a comprehen-sive methodology, known as Dataplan, which was employed In the Petrobras project.

consultancy and as UK agent for

consultancy contract for the largest company in South America, particularly with selection of a non-IDMS database, should serve to further guleten these

interactive records

elther nn cards or via the direct normal batch mode, but the new

...in four stages

tion has already been approached by several existing cember 9, 1976 and January 13). Now a company has been formed to deal specifically with

database consultancy. Learmonth and Burchett Monagement Systems, based in Loudon, was started by Roger Learmonth and Rainer Burchett, both previously principal con-sultants with BIS Applied Sys-

They have devised a methodology for developing a database structure sulted to a company's operations and Information needs, and setting practical questions of implementation

and performance. This strategy will be marketed in a variety of ways. The company intends to take on full database evaluation studies for clients, assist them in database

design or implementation or train their own staff in use the methodology. LBMS' approach is to break down the process of database implementation into four clearly

The user begins by analysing the data resources and relation ships into "third normal form" according to the relational procedures developed by Ted Codd, of IBM. This task, on the surface complicated and discouraging to many users, is alded by standard forms and

The second stage, logical design, involves conversion of these natural data relationships into a data structure which mosts the company's needs for

These two software-independent design phases are followed by a physical design, on the basis of the user's selected database

munagement system. Appropriate documentation

elating to the most popular DBMSs is provided. Lastly the line with security, performance and disc-space requirements.

There is bound to be some

cepticism ubout the feasibility separating these consideratlons catirely, but initial reception for the LBMS philosophy seems good. The company niready has four clients signed up for its services, though no

Aunties Selling Anne

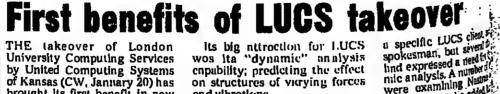
The BBC Computer Unit has been selling time service and back-up on the 1900 for years. Now, we have 12 months' experience on the 2960

machines. That's the 1904S/192K under George 3; and the 2960 3Mb, operating under 5X23 VME/B (VME/K can be made available) IDMS, MAC,

and we want to sell surplus capacity on both

RIE and TP facilities too. We have technical support staff to assist customers, and our costs are highly competitive. Dedicated machine time is available Saturday/Sunday. For more information contact Bob McLean,

Computer Operations Manager, BBC, Sulgrave
House, Woodger Road,
London W12 8QT. Phone
01-743 8000, ext. 4974 or 4' London W12 8QT Phone 01-743 8000, ext. 4974 or 4752.



prought its first benefit in new software terma, LUCS is offering the Nastran structural anolysis aulte, aiready handled by the US

Nastran, already provided by several other UK bureaux, was developed by tha US National Aeronautics and Space Administration and extensively used in the US space programme.

Puzzler

PLACE 10 pennies in a row, and then try your luck at transforming tham into five atacks of two coins each in five movas, undar

the following conditions: Each "move" must consist of plcking up a single panny and passing it over exactly two others (left or right) to lond on another single penny. The two coine passed over may be either two singles, of one already-atacked pair. See page 81 for soldilon.

ond vibrotions.

chief guest speaker at the second

LUCS' existing structurni onnivals softwore, from angineering consultoncy Freeman, Fox and Partners, coters only for "static" forces.

LUCS confirmed that likely to be further in packages from the US Nastran was not imported for Release of

THE graphica software Podds, long under development by the Production Engineering Re-aearch Association has been

Padds is to be marketed with a purposa-bullt plotter tarininal, based on a Digital Equipment PDP-8, and run via a connection to the Solcon bureau's Univac

1108a in Milton Keynea, Bucks-Padda is designed to provide detailed drawingan enginearing components. When rough drawings have been produced, the enginear enters a description of the part's geometry in aton-dard enginearing terms. A detailed drawing is genorated.

tolerances, surface finement required after at ture, and other published essential for controlled for controlled for controlled for the business of the busin materials,
A)though the burst of the main process the main process interpretation of points interpretation of the main process of the main process

great Interest, he

firm contracts had bently

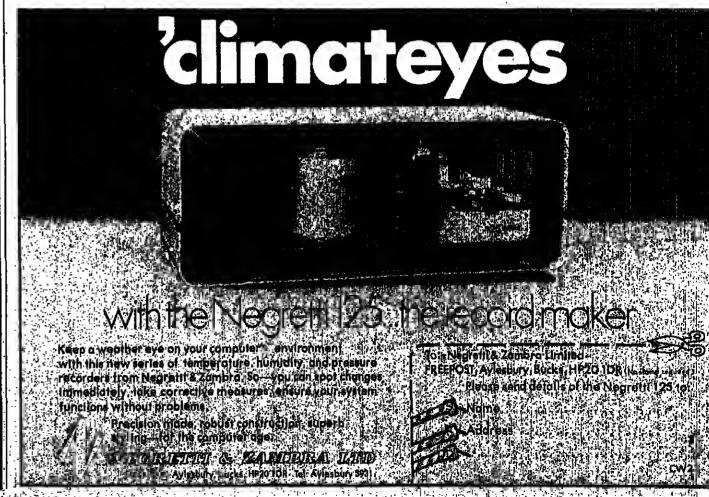
puter. This mean internal information can be set terminal in a brief long.

flowcharts. These now include symbols for the sequenc , Iteration and selection constructs This form of programming constraint arising from a software developer's idea of what the programmer wants is typical of auch producta. Does

grammer'a requirementa? Con anyone with experience of such aids tell us whether they work, in terms of increased productivity or more maintainabia programs; or do they simply cramp the progrommer's styla?

SPS was conceived about three years ago, and has sinca; been updated, particularly to deal with the rise of atructured programming. According to several of our correspondents, however, structured program-ming is the way, good programming had always been

This ralaes another interesting question. How real is the avoldtion of programming





COMME CALLIN STATE BY LAMBOUR AND THE

PHONE 01-261 8757

CoOperators supply first-rate

contract operations staff for

Elevator control for high rise buildings



US Elevator's William Hosischer holds the microcomputer system designed to control eight elevators. Behind him, one of the three electrical cabinets that the system replaces.

normally available with micro-processor systems in terms of

saved space, lower cost and

greatly increased reliability, yet there is a minor problem. In the

words of Hoelscher, "Presently,

there aren't many new buildings

lining, for as Hoelscher points out, "The elevator aystems in

many old buildings are wearing

out". The company has found at least one new building in which

A contract for an old building

Although the PiC 1650

an extensive repertoire of prog-

ram steps are not normally

needed, its memory capacity can be extended up to iK by 10 bits by adding on a PIC 1664. This can be achieved by using one of the bit registers associated with each 1/O pin as an extra address

blt. Together with the 9-bit program counter register It provides a 10-bit word Instruc-

opportunity of presenting their

latest

products

Further information and

ragistration forms can be

But every cloud has a silver

under construction'

to install the system.

ONE of the classic control applications for the microprocessor, discussed in detail at many a seminar, is the elevator in high rise buildings, Now US Elevator of Spring Valley, Cali-fornia, has produced one, and ironically is finding little opportunity to apply its expertise.

The US Elevator system, the

work of William Hoalscher, the firm's chief electronics engineer, is capable of controlling the operation of up to eight elevator cars serving buildings with a maximum of 48 storeys. Since not all evelators stop at all floors in high rise buildings, the eight can be stretched to cover a 100 storey

GIM debugging system The system has been dasigned to accept a variety of standard PROM devices to make up the

A PROGRAM debugging system for use with the PIC 1650 single chip microcomputer has been introduced by General instrument Microelectronics. required capacity. Favoured configurations by GIM are three, 256 by g bit or three, 512 Called the PIC 1664 developby 4 bit memories. ment microprocessor, the system provides access to an external PROM program store. intended primarily for industrial and control applications, where

in this way, operating programs for the 1650 can be tested before being committed to the device's on-board, maak-programmed ROM. The PIC 1664 is dentical to the i650 with the exception that the on-board ROM, which has a capacity of 512 by 12 bits, has been removed from the chip. Instead, the ROM address ilnes are brought outside the package for connection

Euremiero 77 symposium

NEW concepts, recent developments and future technical possibilities will be among the cations. In addition to this 77. a conference being organised by the Europeon Association for opportunity of presenting their Microprocessing and Micropro-

gramming.
To be held in Amsterdam, developments in the areas covered by the conference. from October 3 to 8, the conference will range over a variety of auhunns in the micro erea, such as microprocessors, bit slices, microcom uters, microcomputer software, microprogram-

btained from the Duromicro 77 Conference Secretariat at Congres Bureau Vrije Universi-teit, De Boelelaan 1105, Amsterming, multimicroprocessor sys- dam Holland.

Intel's control device

A tracrompour-based paripheral control device has been introduced by Intel that can be used with any microcomputer system employing a standard bus struc-

Designated the 8041 Universal Peripheral Interface (UPI), the device controls peripheral handshaking and protocol for interfacing with the outside more directions as pre-processing by using the type \$243 which can of data, error checking, code be carcaded to provide virtually conversion, arithmetic opera, any number of lines: handshaking and protocol

tions and formatting.
It comprises a CPU, IK bytes of program memory and 64 bytes of read/write memory. Data transfer between the aystem and the UPI takes place via tha data bus and an on-chip 8-bit data buffer. The device uses two g-bit programmable 1/0 ports

ANALYST

NEW TELETYPE 38 ASR

UNOER £1,000 OUTY PAID plus delivery and VAT. Still the meet pepuler, aconomical, relieble end varsatile terminal. Delivery 4 weeks.

Also rental and ofter colon service.

Teleprinter Equipment Limited, 70-80 Akeman Street, Tring. Herts HP23 6AJ, 0442 82 4011 (7 lines), or Telex 82362.

7 7 18 7 6 ADX6300 Systems

is being sought, primarily to evaluate and demonstrate the possibilities of mating the new system to old equipment. Hoels-cher admits that interfacing the two does have its problems. Please ring: 01-353 6060 Ext. 57 with full details of equipment with price, etc.

> **Contract Staff** available

for Homa and Ovarasas asalgnmanta

01 680 2400 Matra Lowndaa-Ajax

119 High Straat, Croydon CRO 1QJ Wa are always intersated in hearing from paople who wish to work on a contract basis

YOU NEED THE BEST SO FORGET THE REST

Metra

Lowndes-Ajax

Contact Sarah Smith on 01-283 3237 for

- * Top quelity contract programming stail always evailable. * Rates from £150 to £220 per week.
- * Permenent stell elso everleble

ARTON associatea 206-210 Slahopagate, EC2 FOR COMPUTER PEOPLE AT THE CROSSROADS

PROPERTY FOR SALE

GOUDHURST, KENT A quaint Bijou deteched period cottege residence of cherecter. Believed to dete from XVII century. Testefully modernised throughout, including full central hasting yet retaining its original cherecter and charm. Boesting a wealth of exposed beams and timbers and a line inglanook lireplace. The accommodation, which is erranged on 2 floors, is as follows: Dining room, lounge, kitchen, 2 large badrooms, bathroom, separate w.c., garage. Price £17,000 Freehold o.n.o. Vecent possession. This property must be seen to be encredeted.

SOX 1885, COMPUTER WEEKLY



TELEPRINTERS - 120 CPS Available in KSR and ASR versions
Switch selectable speeds up to 120 cps.
ASC11 / APL ks yboard.
Options include Vert / Hor Tab., FIFO Buffer atc.
Nationwide Sales and Maintenance.

DATA DESIGN TECHNIQUES LTD.

PROFIT FROM YOUR COMPUTER WASTE

12 MONTHS FREE SUPPORT projects, fromovs **QATAWASTELLIO** programs to major spile: contact Terence Salmon 000 8 Tectonics Ltd 54 Tintagei Rd Opings The fixed price fixed time with

tectonic

IBM 360/50 512K CPU 6xIBM 2401-005 1xIBM 2804on immediate availability contact Jo Yates on 021.704 2655

CPS Brokers Ltd. Serck House, Solihull, B91 3DG

FOR SALE

8 track paper lepe equipment. 2 into STC GH2100 transmit/receive tarminal. 1 into Olivetti SV40 printer (attached to obova). 1 into Plessey transmit only terminal and 2 into Kode 72A key punch verifiers.

Contact: R. A. Bantieman Tei: Stainas (0784) 51321 axtn. 135

AVAILABLE SEPTEMBER / OCTOBER

PDP 11/40

DEC Maintained -21/2 years of

96 K words core 2 R P O 3 Disk Drives + Controller 8 DL 11E Interfaces 1 Cabinet for T U 10 Magtape

Also available: Air Conditioning Unit

N. J. A. Boniona Chatto, Bodley Hood & Capo Sarvices Ltd 9 Bow Street, London W C 2 E 7 A L Toi 01-B36 9081

IMMEDIATE DELIVERY OF NEW

PDP II v 03

Floppy Disc Systoms with software packages in STOCK CONTROL PRODUCTION CONTROL LEDGER. ANALYSIS

Low cost version of those packages suppled Intel/Memorex lloppy disc systam at pross kil £6,000 complete

data-J

Data-J Ltd., 7 Churchill Court, Rustington Tel: 09062-72902

VDU MPU CROFTON ~ 01-8911923

WANTED

.C.L. ; 1901/1A System with magnetic tape.

Please send details to: Mrs & Smith 22 St. Helens Close Grantham, Lines, or Phone 0478-67924





ELECTRONIC BROKERS LTD (W(D(P) FOR USED DP EQUIPMENT BUY OR SELL THROUGH 01-464 9011 Hand Punch **NEW DE LUXE 80 COLUMN PUNCHES**

Send for Brochure

WE SEL **WE BUY** SCOOP up to 45% OFF HAZELTINE

alatype-compatible CRT Terminals HAZELTINE 1200 1920 Characters, dull/half Ouple: New List Price ES41 OUR PRICE E728 Now Let perce £900 OUR PRICE £828 HAZELTINE 2000 1998 Characters, Edit full their Ouples, and I

to carriege and VAT.

ELECTRONIC BROKERS LTD. (Computer Sales & Services Division 49-53 Pancras Road, London NW12QB Tel: 01-837 7781

Contract Operators, Programmers, Key Punch Ops. phone 491 4706 Knight

plaitings.
Libel arrivet — super PGFS EISTEM
CHEPOPEE AS personated
RESEA Programmes Panni
RESEA Programmes Panni
RESEA STANA Syrial bindracce
RESE Einh Central
TX PAUS-89 libel brives
Research in ularature GEC all, cobinel complete with
privet Reply. In Immediate condition and highly
recommended.
RESEO RESE TREATMENT megablic lope station in
sendant RESEA. plandard DEC Bri, espiret Large slocks of againment and apartie. Cull in at gut phonocome or mand for calcinges

Birmigaham/Midlanda 370/135 - 512K TIME AVAILABLE ong- or Short-Term plus services

For details ring: 021-707 4800 Ask tor Phil Hull or Berry Hegarth

OLD COMPUTERS
J. & M. COMPUTERS
47 High Mead
Reyleigh, Essex
Rayleigh (0268) 742851

WANTED

ELECTRONIC BROKERS MINI COMPUTER

EXCHANGE OFC FORE and PO'll Series Niets and Paripherais. ASPEZ & KEREZO Teletypa Terreloyle — tell

reconditional Coded and Uncoded Keyleards, Hagnada

Olivatti P603 Computar EO8 Equipment Ltd. BCM Box 878 WC1V 6XX Phone: 01-404 5011

TELETYPES

lining, Repeirs, Overheuls, Relur-ished Mechines, Maintenencs Meke s phone cell — Sava a possible 25%

COMPUTER TERMINAL SER-

VICES Medway (0634) 407001

WITH SKIP OR NON-SKIP OPTION A/N KEY TOPS, CHIP TRAY, WRECK KNIFE, OUST COVER. MAINTENANCE AVAILASLE **FOLLOWING 1 YEAR GUARANTEE PERIOO**

CONTRACT

★ OPERATORS ★

★ PROGRAMMERS ★

* PUNCH OPERATORS *

LEADING SUPPLIERS OF

CONTRACT OPERATIONS

PERSONNEL THROUGHOUT

EUROPE

SAVE TIME AND

MONEY

CALL US FIRST

01-493 6696

01-499 1787

OON STREET, LONDON

WESRTED D/P BERVICES LTD. WEST WAY 28%

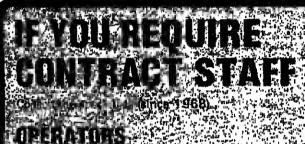
long or short term needs RING 01.836 8411 MELSON COMPUTER SERVICES LTD.

COMPUTER SYSTEMS - ICL / IOM / OEC / BCL
DATA-PREP EQUIPMENT — ICL / ISM /
UNIVAC / KOOE / TELETYPE
BURSTERS/DECOLLATORS/GUILLOTINES
D P STORAGE CABINETS (Inc. FIRE PROOF)

Hand Punches £85 each URGENTLY REQUIREO 19M 029 Print Punches Bowe 301-302 Outllottnes 2 part Decolators (any make

FOR SALE

FOR FORTHER INTERMETTER CONT. ACT St. John's Court, Revienstell, Lance BB4 7PA. Tel. Rossendale (07062) 20125



Il Lavels unto Citiel Operator (Data Prep staff as well) PROGRAMMERS

ANALYSTS

Up to Project Leader standard

Personnel can be hired for ANY length of time.
Contracts are accepted on short notice.
Retes are based on experience of the person supplied.

Phone 01-439 6481 NOW

(24 hour Answering Service)
PS Doirt Torget our PERMANENT RECRUITMENT
SECTION for all operators, programmers, analysts,
managers and sales bersonnel



EFFECTIA GRAVIS

OPERATORS PROGRAMMERS TO KEY PUNCH OPERATORS TO KEE SUPPORT SERVICES YOU KNOW YOU CAN RELY UPON

KPG Ltd 28 THE BUTTS BRENTFORD MIDDX 01-568 7345

IDON WIVETE

UK & EUROPEAN CONTRACT REGISTER

OPERATORS PROGRAMMERS SYSTEMS ANALYSTS

WEST END HOUSE, II HILLS PLACE, LONDON WIR 1AG. 01-439 8891

145 WARDOUR CHEELE

computer services limited

CONTRACT or PERMANENT— ANALYSTS - PROGRAMMERS - OPERATORS PUNCH OPERATORS - DATA CONTROLLERS

Tel. 01-487 5781 28A Devonablic Street - London W1

Total DP Support at a Programming Open Data Prepara Con Data Control 🗓

Contract & Permai

Comment of the second of the s



Coventry's generous response to Scanner Appeal

IT seems os though the whole population of Coventry and the surrounding orea must be helping the Coventry Hospitol EMiscanner Appeol in one way or another, either by organising events or by attending

Events have included a sponsored walk, a jumble sale rim by a 13-year-old girl, and a barbecue, and Coventry City FC has announced that all players' fines will go to the appeal.
Local industry, including Mit-

oraceriae at a sala orac

Liveware File by Don



TELL ME - OUR NEW



... WHAT GENERATION

SEPTEMBER 6-9 Campcan 77 — micros, mints and maxts. IEEE (USA). Washington, DC.

SEPTEMBER 7 Developments in micropublishing sominar. Microfilm Association of Great Britain. Oxford, Details: Executive Secretary, MAG9, 8 High Street, Outlidfard GU2 SAJ.

chells and Butlers brewery ond 200 of

its licensees, is generously support-

geon Bill Whalmore and Coventry

£150,000 by next March to cover part of the cost of an EMI X-ray Scanner

which is used particularly for cancer detection. Anyone wishing to con-tribute should contact the Appeal

Royal Marsden Scanner Appeal.— in the London area, The Roysl Marsden Hospital Scanner Appeal

has been launched in the computer industry to raise the cost of the computing stemsnt in the hospital's newly acquired EMIscanner. Com-

panies and private individuals wishing to contribute can contact

the Cancer Research Campaign at 2,

Carlion House Terrace, London

Ayers at Tritech Computer Services

SW17, or the appeal organiser, David

0203 22037

miliee chairman, Mr Collon on

inessmen. It alms to raise

SEPTEMBER 7-8 Registration for BCS exam courses, and HNC in Computer studies. Slaugh College

Numerical

elections

IN elections at the Britialt Numericu

Control Society, M. P. Hewitt has been made president in successation

to Sir John Toothill, the socioty's

iral president. Hewiti is director and

cal Controla Ltd and is a member of the councils of MTIRA, MTTA and the iProdE.

Chairman is Isn Coull, who has

been chairman of the Western

Region and of the Scottish Region

Jimmy Dawson becomes vice-choir-man — he is sales director NC of

as corporate director of marketing

communications, a job he held with

them between 1973 and 1975. Lat-

terly ha was a partner of Bedford

id a subsidiory of Jewel Cumpony

Peter Frost, a director and pro-

Ken Cockerill goes to Geest Mini-

Brian Wells, until recently chief

Michael Treston has left Inters-

can, where he was OCR support manager, to Join Memory Ireinid as

Accupower engineer with Emcrson Industrial Controls, has now become

computer as a systems sales consul-tant from Redifon Computers, where

duction executive of Coutant Inter-national, has been appointed direc-

monager for three years.

hs was a territory manager.

uality control manager.

computer sales manager.

Associatea, a Connecticul consult-

Keamey and Trecker Morwin.

Control

Stored program contral of telaphona switching systems — second vacation school IEE. Calchester, Essex.

Experience and technology of data-bases. Onlino. IEE, 9avoy Place, London WC2. Septemaer 14

Computers and privacy/jaint meeting. Alex Lyon (O. Fisher chairmen). BCS Leeds and Humberside branches. Royal Station Hotel, Yark. 18.30.

SEPTEMBER 14-16
Society for Management Information
Systems, annual conference, Dallas, USA.
Details; SMIS, SUITE 2028, 221 North
LaSalle Street, Chicago, Ill 60601, USA.
SEPTEMBER 16
Vandallam, asbotage, it couldn't happen to us — the security aspects of operations. BCS Operations Group. Polytechnic of Central London. 15.00.
Computers and people. G. A. Fisher.
BCS, Guildford branch, Civic Hall, Guildford, Surrey, 19.30.
The proposed traffic control system for

The proposed traffic control system for Norwich. Or A. J. R. Rawley. IEETE. Assembly Hause, Theatre Street; Norwich. 19.30.

Soccer

Northants Computer Weekly Gun

EAMS of computer stall from annual event held in a differential installations till over Northampton of the country each year. shin are completing for the North-amptonshim Computer Weekly Cup an a live-n-sule tearmament this Similary The tournament is living originality. The tournament is living originality to Alan Bance is pro-originality to Alan Bance is pro-proprieted by Alan Bance is pro-computer at Avon Cosmetics, and is grammer at Avon Cosmetics and is multiple will be presented by the last of what will become an Best, captain of Northamptonte.

Summer Computer League dance

THE Limiton Summer Computer the sum one. The Eurologe Copin the Sum on the Wellouber Sum of t The river trip will include a disco. militer and bar Tickais will cast about £2.60, including bullet. The organisor. Danny Bureham, needs some iden at the likely minition, so captains please telephane lum on 01-240 3223 as soon as possible The Computer Weekly Cup Inc

that ropht Lillosi rosults

Olvision i Lloyils 8, Camshan 1 London Transpart 5, Southwart 6 Lamboth 5, Computer Weekly 0 Southgate 5. Computer Westing

CONFERENCES

William Smith has rejoined Dain General at their Massochusetts HQ AT the next meeting of the BCS infarmatian Ratriaval Specialist Group three talks on the subject of computer access to large dutaliases using alterna-tive store technologies will be given. Ken Groves of Stabletron will speak on computer-cantralled remote microfilm retrieval systems; Peter Waterworth of retrieval systems; Peier Waterworth of Plessey an mass starage using holographic lechniques, and the impact of entamoted microfilm retrieval in the R&O environment will be the subject treated by Roy Brierley at Wellcume Research Laburotories. The meeting will take place at the City University, Landon on September 28, and tickets (E1) may be obtained in advance from Panting Walters, The littlish Computer Society, 29 Portland Places, London WIN 41111, tel 01-037 0471. Sergio Ferragui becomes director of International marketing with Cullinane Corp of Massachusetts. He was formerly president of Servi-clos de information, the DP subsidiary of Aurrera, which is the largest department store chain in Mexico

THE nutomotion of the mass-production ol small and medium-sized grouls is the subject of an exhibition to be held in Serne, Switzerland, on September 19-24, the Sulon International de la Production tor and general manager of Coutant Electronics' lifracombe pluni, of which he hos been general works antomatisee, SAMA 77. Various uspects of electronics and telecommunications will be represented. For buther tabulantom contact the arguntsets, SAMA International, CII-2501 Itherms, Switzerland, tel: 032723 00 30

> A SEMINAR on computer security and privicey will be held by BIS Applied Systems on October 20 at the Cufe Koyal. London, Speakers will Include Peter

Hamilton, o director of Chulb Sac-Services and editor of Handbot a Security; Ray Ellison, head of secon NCC; Iam Watson, the partner is dry of nuclin at Peat, Marwick and May of nuclii at Peat, Marwick and MAY-Subjects cuvered will include in: Industrial explosage, desiractle; information and the privacy of panal information in computer systems into details may be obtained from Dec-Cuilling, SIS Applied Systems 18 38 [Unckfriers Road, London SEI 88 2, 01-928 9511.

INFORMATION security and water creating are the subjects of two or? ences organised by Online for aminon. The conference on the peritor of computerised information statutes place on September 27-28, 5 at management responsible for the property to guard sealers index THE opening of EMI's new all minagement responsible for the incustives to guard agalax infect explaining ond sabolage at ast ember/dement and informationpiles. An examination of the bast at processing system, word proceed; practice, the less-paper office data ments in primiting technology, the base of the system of the specied in the specied of the specied of the specied of the specied. processing me some of the aspectacly which will be dealt with dum 7 conference on this subject on 0.19

25-20.

This conferences are non-resker and will be held in London, at the sign Centre Harri. Further details are actar from Online, Cleveland Road, luke 11118 21111, rel: Uxluridge 39262

Rickmonsworth, Manchester aml Leeds, three in Sweden, two in West Germany, at Frankfurt and Dusseldorf, and one in Cupenhagen. Toking over as managing director of the whole operation is John Wallnes, formerly controller, audit and control, in NatWest's own DP

> computer centre in Hayes, Middlesex has given Wright Air Conditioning's London subsidlary its biggest order. The company has supplied six Wac-pac air conditioning units and designed o special panel for noultoring them. The centre includes on 800 square metres computer suite housing a dual Honcywell 66/40 and an ICL System 4 (CW, July I, 1976).

FOLLOWING the merger of modem manufacturer Milgo Electronic Corp with Recai Electronics, the Mlaml firm has been renamed Racal-Milgo Inc. The merger was announced early this year (CW, February 24) and made effective on Au-gust it, Meanwhile Racal in the UK has increased Its share in the alarm and electronic equipment manufacturer, the Brocks Group, the more than 11% and taken a 5.45% share in the dwest mechanical and electrical engineering group.

A COMPUTER was used for the first time to process results in the Chichester Harbour Federalion Regatts Week, The machine, a small B80 system, was losned by Burroughs, which also wrote the software. The system held detalls of each race and all 350 entries and printed esults, taking into account nandicaps.

A LEAFLET is now available from Intel which describes its Insite program ilbrary. It explains how micro users can join Insite (the Intel Software Index and Technology Exchange) and lists more than 250 programs covering a wide range of applications that are svallable through the library.

AVAILABLE from Dicoll Electronics in the Votrax ML-1 voice generating unit couling about £7,000 which translates digital computer output into synthesised human speech. Its applications for handicapped people are obvious and the unit has a capability of 122 phoncemes, and four phoneme rates (variations in a group of speech sounds in a language).

CONTROL of the environment at IBM's multi-storey education

VOU eltached to the main Nove 2/10. The main purpose of the tests is to observe possible in-flight behaviour of the materials used in the second stage of the rocket, and the work is being carried out by engineers from VFW-Fakker and its subsidiery ERNO. and to compress this so that it can be prepared in analogus converters. Another Nova 2/10 and a Nova 2/4, interfaced to this main computer, are used as **Cost of military** software '20 times greater'

Expsrimental data is displayed in real time on e

Another important problem

organisation. "A commerciai

development is controlled by the

DP manager and only needs to

satisfy a specialist group of users. In a military environment,

several parallel sections of users

are defining their own require-

ments for the same system,

more difficult,

A STUDY by US market con- by cost, and prefers to walt for sultancy Frost and Sullivan the new hardware to prove claims to have uncovered a 20 to one difference between the development costs of military and commercial software. The high cost of military development, ssys the report, applies not only to complex real time systems, but also to programs similar to those in commercial use, such as mansgement information systems.

Novas used in rocket testing

THREE Date General Nove computers are being used to check-out instruments and run simulation programs on Arians, one of Europa's latest rockets and successor to the earlier Europa i and II types. A

Nava 2/10 is used to control and process input deta,

NEWS IN BRIEF

Bank buys up

ONE of the biggest computer output microfilm bureaux in

Europe, Eurocom Data (Hold-

ings) Ltd. is now 100% owned by

the National Westminster Bank.

This follows the purchase by Nat

Wcsl of the 50% shore held in Eurocom by the US Bancorp of Portland, Oregon. This organi-sstio owns the US Datacorp, the

biggest COM bureau in the US.

Founded in 1974, Eurocom

Data now has four branches in

the UK - in the City of London.

COM bureau

The US armed services willi spend \$6.68 billion on software during this financial year, states the report. This puts the cost per debugged machine-code instruction at \$30. A US consultant on cost estimation in the commercial field says that even a pessimistic estimate would not put costs above \$1,5 per instruc-

Spokesmen for Software iences and Systems Designers Lid, both experienced producers of military software in the UK conceded that a similar disparlty existed in this country.

Neither company had collected detailed comparative statis-tics, but the figure of 20 to one was thought unlikely, even for efficiency-critical real lime pro-

The efficiency, reliability and iow core occupancy required of military software are the chief factors influencing the cost, said SDL director Phil Swinstead 'This may be considerably higher than the cost of simple commercial software, but some of the more complex commercial systems, such as process control suites, are of the same order of cost as milltary programs," he

Fred Eldridge, of Software Sciences, concurred, "You don't expect a single-seater sports car to cost the same as a family saloon," he said. When efficlency costs were discounted, there could still be factors conducive to a higher military cost.

'Milltary users often go for the naweat hardware, which may be potentially more effint, but still have teething troubles. The commercial stallation is motivated totally

Duke to open **Business Show**

THE Ouke of Kent le to ppan the international Business Show, to be hald at the National Exhibi-tion Centre, Birmingham, from October 11 to 20. He will fly in by helicopter to

Ha will fly in by helicopter to tour the exhibition before the official opening of the show, which BETA (Business Equipment Trade Association), the organisers, are hoping will add substentially to UK office equipment exports. These totalled about £689 million in 1876. 1976.

Miltope range

at IBM's multi-storey education centre at Greenford, Middlesex, is to be added by masking windows with Msdico aolar film, made by Doulton Gisas industries. The film is intended to reduce glare and internal room

Tactum now available in Sintrom-Ellinor Consisting high speed printars, magnetic tape Iransports and controllers, and flexible disc aystems, the product range is manufactured in full inflitary specifications.



Second stage of the new European rocket, Ariene, is seen here undergoing environmental testing.

Camol for Army courses

THE Royal Signais Trade Trainng School at Catterick hos installed an iCL 2903 to run the Computer Assisted Management of Learning system deve-ioped jointly by ICL, Brighton Polytechnic and Ulster University as part of the National Development Programme in Computer Assisted Learning CW, April 8, 1976).

The Camoi system heips teachers and students to monitor progress through courses. It includes facilities for multiple choice examination morking and analysis, and is used by two polytechnics, Ulster University and six secondary schools.

The Catterick school trains the 8th Signal Regiment and also runs courses for soldiera from other corpa, and from

foreign armies.
The school has itself been running a £15,500 project as part of the national programme. The project involved examining different learning management systems to see how they could best meet Its needs.

Special Offer and absorbing game with special interest to computer personnel the game you will never want to stop playing!

OTHELLO is a gama of otratagy for two players. It is pleyad with two-sided, black and white countere en o equared board. At each move you capture one or more rows of your opponent's pieces by trapping them between your own pieces. The captured placas are turned over to show your colour. The process the game, and part of the appeol to the potential for dramotic reversols right up to the last move of the gama.

 Teke adventege of Computer Weekly's speciel GTHELLO offer and you will get a chance to join the Brilish Othelio Federation and take pert in next year's. Brilish Championship. The prize is a place in the World Championship in Hewall,



sets of OTHELLO at £3.75 per set. f enclose a chaque / postal order for £ made payable to THE DAVID HANN ORGANISATION.

Send this coupon and your payment to Computer Weakly Othello Offer, The David Hann Organization, 7 Brighton Road, Curbton, Surrey, KTS \$1.X. Use block capitals—this coupon will be your address label.

A special event from the Infotech Minicomputer Division Minicomputers for Commercial Real Time

4 - 6 October 1977 London

Growth of commercial real time

Design considerations in commercial real time minis. Mainframe or mini - a comparison
 Software, operating systems

 Interconnection memods and: Sisting, maintenance and

Minicomputers for system.

 Dittributed processing systems. Jennifor This course provides essential information for commercial data. Woodhams on princessing users who need east - effective, real time systems, 0628 35031

INFOTECH INTERNATIONAL LIMITED

35031 or 32568 (STD Code 0628) Telexi 847319

For further

telephone



Symposium on datu nnalysia and infarmatics. Institut de Recherche d'infarmatique d' d'Automulique, Roequancourt, France.
SEPTEMBER 9

Dataheso management, focue an usor asperionce, seminar. BCS. Holiday Inn, Birmingham, 9.30. 9 EPTEMBER 9-9

Meeting, IAM Camputer Users' Asso-ciatian Programming Group. De Vare Hatal, Coveniry. 9EPTEMBER (1-19

Display ward processars, Rager Waolfe, BCS, Sussex branch, Imperial

waone, BCS, Sussex branch, Imperial Hotel, Hove, 19:30.
LAMIS, BCS, Dundsa branch, Quaena Hotel, Dundsa, 16:50.
SEPTEMBER 14:18
Meeting, IBM Computer Users' Association Scottlah Group, Esso Motor Hotel, Erakine, SEPTEMBER 14:18

wich 18.50.
September 19-22
Applications of numerical software conference: Institute of Mishematics and its Applications, Southend. University of Sussex, Brightes

INTERNATIONAL EDITION +

al Higher Education, 9lough. Dotnils: Itr E. Huzun, tel: 79 34585, oxt 5. SEPTEMBER 7-9

in Suptembon, Paris awakana homi da August Indiday slopibal is biling listel i SICOB, GISO OF the major Emopular computer allows

Computes Workly, of crasse, has no amount and our international isses to Supporting 1th with the litted with a summing and coverage of its world computer areas. In knowing a good of province of this year's SECOS. Where Computer Workly will be achieving for the less have and architectual copies of this special see will be this time our brand. With an evental distribution of over \$5,000 U.S. 7.3. B7.3. Queroen 21. Afth that ream will provide in an ideal opportunity for export minded compones to display then products occupanced and sovices to this using outdence of decision makers throughout Western Eurupe.

COMPUTER WEEKLY

The fellowing special aupplements are due lo

be published during

BONUS CIRCULATION

SICOB PREVIEW

September 8th

SEPTEMBER

SYSTEMS and SOFTWARE HOUSES/ EUROCOMP PREVIEW September 15

Soltwam can truthfully he said to be the tille blood of the computer system. Welcome controlling soltwore, the most advanced computer handware is incapable of performing even the simplest tasks. The latting cost of herdware has see a software as increasingly important loctor in the costs of runsley a computation.

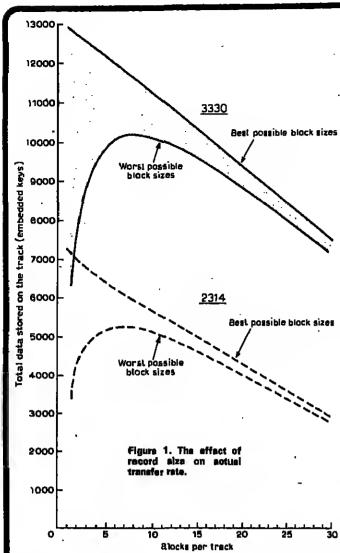
On September 15 Computer Weekly will publish a special supplement on Systems and Software Houses. In this issue, we take a look at some of the types of software which the user of today is likely to be seeking.— From date dictionaries to specially programs.— and expants in the Italia give some guidance on selection, We are highlight some features of the changing shape of the software industry.

DATA STORAGE MEDIA September 29

Data stolage media can come in widely different forms these days — anything too the humble punched card to the multi-Mega byte semiconductor main metady with fincility of a microsspood pages that Some of the most important developments in this wide area include the practice application of bubble memorias, the profilement of floopy disc storage and the repid increase in the densities of MOS memory and must disc storage. Made Supplement on September 28, will cover these subjects some others and include information and views from suppliers and independent constitutions.

LONDON AND WESTERN Stephen Measures OI-2S1 S293, Tony Keminski OI-281 8022 Seemin Measures OI-2S1 S293, Tony Keminski OI-281 8022 Seemin Measures OI-2S1 8109, Lloyd Collins OI-2S1 8787 MIDLAND Ken Parroll 021-358:4938 NDRTH AND SCOTLAND Harry Asian 081-872-4211

Stop Press: Computer Weekly continues to publish note of half recruitment advertising and has a higher fully requested ALL of half recruitment contained at 73,973, then any other U.S. employer public of Additional 21,260 regular readers in Western Secretary and INTERNATIONAL EDITION which is published the 2nd week in minute appearance of the 2nd week in minute appearance August and December.



By Owen Hanson FILE DESIGN

IN theory the file designer should consider a number of media before deciding which to use; In practice the chuice usually lies between magnetic tape and removable disc.

Storage devices

Drums and fast flxed-heud discs are limited in capacity and therefore most used for table or Index storage. Magne tic card devices such as CRAM or date cell provide slow access but massive storage capacity. Their relative lack of speed and . reliability has led to the substitution of the modern fast, very high capacity removable discs in most ceses, although they can still be found in insurance epplicutions. The Netional Insurance Installation in Fleetwood uses CRAM, for example.

The range of discs end tapea avallable is very wide. Table 1 gives deteils typical of devices that are available from most major manufacturers.

Magnetic tapes

The data given in Teble covers most modern tapes, although users may still heve slower, older equipment. Recording densities of 800 / 1,600

Figure 2. The effect of block sizes on the sales of dats that can be s

characters per inch imply that a potential storage space for 480/960 bytes le lost in each

inter-record gep.
The cost of this is minimal due to the low price of tepes; however, its effect on transfer retes is very merked, end it reduces the storage capacity of a tape, usually 2,400 feet in ength, which may lead to the ile requiring further tape reels. The Importance of this was liscussed in Part 2.

Transfer rates specified are ulways maxima. They are reduced by the time taken to traverse inter-record gaps as shown in Figure 1. Note that. unless record sizes are large. the netual transfer rates will be much lower than the figures quoted by manufacturers. In addition, the curves given assume that a further tape read instruction is issued in time to avoid the tape drive mechanism stopping, if it does stop, the waste of time is greater.

For example, a Univac Universerva 16 will truverse u gap in 5.0 milliseconds, but a physical start-stop will take 8.0 milliseconds. Carresponding figures for the Uniservo 20 are 5.0 and 3.0 milliseconds res-

The effect of record size on the length of tupe required is the inverse of its effect on actual transfer rates. For example, if the actual transfer rate is 25% of the figure given

Size of dalla records on taste (log scale) by the manufacturer, the file will take up four times as much space on tape as it would do if

Blucking records on disc can crucially affect performance, is has been stressed repeatedly in this series. Because of the mnny gaps introduced by multiple records on disc, larger blocks make hetter use of the available stornge space.

The size of block chosen is important. Figure 2 shows the effect of block size on the data capacity of IBM's 3330 and 2314 discs. This makes it clear that it is vital to choose appropriate Idocking factors. particularly for large blocks.

The manufacturers usually provide tables and formulae that the user can employ to estimate the effect of any given blacking factor chosen. Figure 2 emphasizes the meaning of these tables, and the user may find it helpful to construct one for his own devices.

Dises do not have a direct equivalent of the tane start stop time, in that the gap between two records will be traversed in about 0.025 0.1 nlillseconds, and the disc spins constantly, so avoiding stop-

yeers in toctinical management systems analysis before King University in 1970, is as so as a consultant both is set However, this very rapid transition from one around to the next makes it likely that the next record will be avail-

Rototional delay

[Millseconds]

concurrent laser enterteinments. They differ from each able before it is required; ma other as widely as the many applications to which lesers ere of this series has concentrate on ways of avoiding or rela now crucisl - brain surgery, ing loss of time as a reside industrial processes, navigetion and communications, nuclear science, and so on.

Choice of media

of of age space required (but)

the Clot and on backing store

and system operation ste-

he checked by referring tot

data supplied by the mande

turer. Sensible use of t

devices available will [

marked dividends in impac-

nous School, London, Ha Mil

and oversees.

Capacity (,000,000s

lile performance.

Laser is an acronym for Light Amplification by Stimulated Emission of Radiation, Unlike Usually the access require ments of the file will force any other form of light, whether stinlight or artificial, it is designer to a particular type: device, and he will minh! involved in choosing cons blocking factors. Occasions perfect collination - with the size is more important andth ides of the beam remaining phy. was discussed in Part 3. almost parallel rather than The implications of # choice on actual transfer to

Lasers can produce continuous light or short bursts lasting less than a millisecond. Conceived in 1958, it used to be n standing joke that the laser was an exciting development in search of an application. Holography is now one of a long list

FOLLOWING on the success of

the Royal Academy's Light Fautastic exhibition eerlier this

year — to be repeated in 1978 —

laser applications. A hologram is a reconstruction of an object or scene as a complete three dimensional image. The recording is made on e light sensitive photographic plate which can then be viewed when illuminated with laser light. It differs from a photograph, an image in one plane only. In that a hologram gives a depth of scene in three dimensions. However, it is not merely stereoscopic: it stereo picture does not change with different viewing positions. For a hologram behaves like a real scene and the spatial relationships change when viewed from different engles le, there are both horizontel and

vertical parellax. The multiple type of hologrem photographic information stored holographically by combining frames of film teken from horizontal or vertical parallax depending on how the camero was panned round the subject.

For by altering the engle of reference to the plate for each tore more then one image, each becoming visible end then disappearing from view when such a plete is rotated through the reference beem.

The complete converse also holds: each fraction of the plete holds the entire recorded Image from its own viewpoint ao thei if a plate is broken eny piece will still reconstruct the entire Image when illumineted with the reference beem - though the perspectiva is limited. I first saw this demonstrated, with literally shattering dramatic effect, at IFIP in Edinburgh.

Holograms very in elze when viewed. Since every colour in the spectrum hes e different wavelength, if an image is viewed by using the same colour light as employed for the recording it will appear the same size es tha subject. But if,

say, the recording is made in the position at Madame Tussauda by Beker Street station meen long queues uniess you book ahead, blue-green light of en Argon laser, the image will appear both lerger than the original end since each house is filled to its nearer the plete when viewed in the red light of e Helium-Neon 400-plus capacity.

The adult eudlence is young, silent, rept. This is no filmed

-Tour of London

Lovelight, s lasar musical: Mairopole Thestra Victoris Leaarium: London Planatarium, Marylabona Road. Leaar light circus: Naw London Thastra, Drury Lana.

project a collage of purely

ebstract colours choreographed

to music on to the dome of the

planetarium - sninetimes plain

sometimes starred by the central

Zeiss monster. During the

classical parts of the concert,

while the Blue Danube plays as

if forever fresh, the images

dance and swirl in delicious

tarmony; the obstracts (seem-

ngly three dimensional

though not in fact holographic

In complementing the Neptun-

home from Holst's "The Plan

dimension to the sensual expe-

rience. I funnd the synthesised

rock and modern items imagle

native and magnificent, especi-

vet without the same suspension

disbelief.

ally in the Pulsar number, and

Summery: Forget the techni-

calities. Forget everything but

the experience. Reinxing exhita-

rating experience not to be

missed. Monday to Thursday

8.00 and 9.15 pm, Fridny and Saturday 7.00, 8.15 and 9.30 pm,

Sunduy 7.00 and 8.15 pm. Tickets

£1.50 on sale on the night but

better to hook up to two weeks

In advance by personal applica-

tion at the box office. The show

is likely to be closed next

2242 for booking enquirles.

NEW LONGON THEATRE

The third and only British

laser show in London et the

moment is presented by Holoco,

the new enterprise whose direc-tors are Nick Phillips, Anton

The opening of the Laser

Light Circus hae been much

deleyed because of the GLC

checks end double checks for

safety. Knowing that lesers ere

used for apot welding metals,

surrounding e show which could

occasionelly sweep the light

The mein theetre hae been

converted into a circue ring

some 20 yards ecross eurround

First end John Wolff.

ecroas your face.

ets" add a completely new

Dennis Gebor first concelved the theory of hologrephy at Imperiel College es recently as 1947. We ere thus only just beginning to exploit holography (the film "Logan's Run" Included a hologrem of Michael York, for instance) but the UK should very shortly see orthoscopic Real Image holographic adver-tisements. I am told Courtaulds essentially monochromatic, co- are likely to be the first, and herent and capsble of near even the ghost in Hamlet will soon he portrayed by hologra-

THE METROPOLE

This poorly advertised show takes its name "Lovelight" from the theme song, which is probably the best thing in it. Immediately opposite Victoria station, e filmed show accompanied by overloud musicul effects, traces psychedelically and with occasional snatches of breathtaking beauty, fast-moving lma-ges from the drawing board broken into four colours; red, green, blue and yellow. These are projected on to a massive aluminium saucer suspended vertically ecross the auditorium. Both the images and the music are fast and Insistent. They are loosely linked Into the stary of Man from tribal primitive to space explorer - but if you lose

The technique employed was to stert at the drawing board, then trenslete the drawings into electronic signais via e grephic computer system which records the signels onto magnetic tepe which is then mixed and synchronised (not elweys entirely successfully) with the soundtrack for eutometic play-

threed it really does not

This tepe is then used to control the mirrors directing the leser beem on to the projection area so ee to reconstruct the recording, a hologrem plete can images for the eudlence. Most of the effects are pure ebstract; others like the fish, tortoise end higher enimals, including Man, are beard on ertiets' drewings.

> was poorly ettendad. Summary: Children 8-14 would love this show. Mondey to Saturday 2, 3:15, 4.45, 6.15,

ed by e high plain wall end together with some two dozen othere we were free to walk 7.45, 9.15 pm. Sundey 3.15, 4.45, 6.15, 7.45 pm. Tickets: Adults £1.25, children end penalonera around within this arene or to just sit on the floor. The ahow. controlled by computer tepes, comprised synthatic music with a dazzling display of laser beams coming from saveral sources and reflected by two contra-ro-80p, echool perties 70p plue one free pasa for any adult occom-penying 30 children. THE LASERIUM teting cuboid mirrors suspanded

In complete contrast, the Lese-technically. This gave us a centrally. This gave us a firm is presented in ideal laser beams, sometimes with its air conditioning and specially designed seats for latticework of light sometimes upward viewing. A large advertising budget, and its prime the first time, I was conscious of rinm is presented in ideal conditions at the Plenetarium with its air conditioning and

just how streight e streight line air meke tha besms appear completely solid. For the first time I found physical, as opposed to mathematical, beauty in the projective geometry: show but a reactive performbut I slso found the floor ence between the leser ertists at extremely hard. The 25 minute e computerised console who show, basically a technological show-off, in no way compares

> The New Theatre is port of a centre, with restaurant, pleasant foyer and bar. After the show we looked at the exhibition of holograms, which included one of an unstable subject (ie of peonic).

with the reloxed artistry of the

Summary: Worth a visit if you

hologrema. Check by telephone (01-405 0072) how science is before setting out otherwise, as on my first visit, you may find the theatre closed. Planned to be continuous from noon till 10 pm deily, it is currently only from 4 to 10 with the main show starting on the hour. Admission £1.20 (80p for children).

CONCLUSION

One can go to any of these shows just for fun, for the novel sensation, or as more scientific curlosities. The Lascrlum Is strangely relaxing and I cannot recommend it too strongly.

Busy senior executives can



marvels st F International's presentation suite et Datafair from October 4-6. Also the BCS Specialist Group for the Disabled will, among more serious demonstrations of the Optacon. which enables the blind to "read," a prototype MA'TE terminal and NPL's MAVIS, be doing computerised portraits in Datafair's Technology Corridor.

But as an artistic experience, there is nothing to beat the

Britain's Premier Exhibition of COMPUTERS, PERIPHERALS. MICROPROCESSORS, TERMINALS AND SYSTEMS

COMPEC'77

Wembley Centre, London November 8 to 10, 1977 10 am to 6 pm (closing 4.30 pm on the last day)

The seventh year of this highly-successful specialised exhibition. An ideal opportunity tomeet the suppliers of every kind of computer hardware and service. Compec '77 is sponsored by the major specialist

publications, "Computer Weekly" and "Data Processing", and is organised for them by Iliffe Promotions Ltd. All are members of IPC Business Press. A free pre-registration ticket will be sent you on receipt of the coupon. Registration at the door without an advance ticket will cost £2,

Room 821, Dorset House,

Centre, which will entitle the

holders to free entry it. tally filled in with the name and address of the visitor.

Stumbord Street

London SE19LU.

Please send me.

SOME OF THE FIRMS

	Device	Haed movement to (Milliseconds)									
	DISCS	Min	Aver-	ħ							
	Medium (IBM 2314, ICL EDS 30;	25	60	1.							
	Univac 8414) Large (IBM 3330, ICL ED8 100,	8-10	30	5							
•	Univac 8430, Honeywell M8U 0451, CDC 33301) Very larga (IBM 3340, 3360, ICL	10	25-30	5							
	33302-11)	1.	л.	ı							

of byles) Mod Diac Maxi-Avormun aga 28-30 230 25 800 16.7 | 100 5-60 1600-16.7- 200-50-55 2500 320 20.3 10.1 Rewind time Post or Zip code.... MAGNETIC Recording densily Inter-record gap | Stert/stop (bytes per inch) (inches) VARIOUS 556/800/1800 0.6 36-180 3-20



and reader crinlers that are as much at home with existing systems as they ore suiteble for new ones. That you get superb readebility goes without eaying. Their precision of design and manufacture are a Rogma hellmerk. And their reliability is second to none, Put the Regma renge to work - soon.



Simply bursting with new ideas.

Programmers

Univac Exec B COBOL Programmer.

ICL 1903 IDMS Systems Analyst

Geneva (also South Coast)

IBM 370 OS PL1 Programmers.

RPG II Programmers - top rates - all machine: PDP II/34 FORTRAN Programmers - ASAP.

Data General DOS Assembler Programmers.

IBM 370 Cobol Ventel/Datashare Programmers

For full details call Richard, Mike or Sue on 01-491 4706.

IBM 370 OS PL1 BAL or COBOL. NCR 500 Operator/Programmer - starting October. ICL 1900 GEO II COBOL and Programmers.

Language translation by computer

By Walter Goshawke

been going on with varying intensity into language translation by computer. So little has been achieved that many people think the task an impossible one. Are they right?

There is no doubt about the need for computer translation. Many periodicala appenr regularly in two or more languages. Many others are translated into the local language by local inguists immediately on arrival from abroad, International conferences on all possible subjects are constantly occurring.

Above all, more and more producta are being exported to more and more countries, involving more and more business correspondence between speakers of different languages. Powerful computers are readily accessible almost everywhere if o satisfactory system of computer translation were in operation, it would constantly be in

Wherever there is an insistent need, research usually follows. About 20 years ago research began on a laviah acale into computer translation. Millions of dollars were being apent in tha

in a feeling of pessimism which extremely widespread and extremely intense. Many computer people feel that computer translatinn is impossible and no further research into it can be justified.

I completely disagree with this viaw, and my reasons for saying so make a long story.

Ever since boyhood 1 have

been fascinated by foreign languages. Almost every day of my life i epend some time aither learning a new language or revising an old one. Like the crossword addict who must do a crossword every day, i have a similar sort of addiction for

i remember pondering sadly that by the time of my retirement all the probiems would have been solved without my aid, i was wrong,

Ali aspects of languages Very little success has been fascinate me, but i particularly

FOR two decades research has echleved, and this has resulted love the nch variety of ingenious, inconsistent and etrange devices which make up the grammar of languages. A new language is always full of colourful surprises, in spite of this luxuriant variety I have always found that whatever want to say can be aaid accurotely in any language. I was inevitable that when became interested in computers,

translation was one of the things I thought of almost immediately. In the early days of the British Computer Society and before, there was a great deal of talk of computer translation, and always attended any meeting could where it was being

There were a number of theories as to how it ahouid be done and the prevalent feeling was one of optimism. I shored this optimism and would hove desrly liked to start researching

However, that was imposable at the time and i remember pondering sadly that by the time of my retirement, then 20 years oil the problems would been solved without my aid. I was wrong, of course. i am now nearing retirement and there are still many pro-

i was also wrong in thinking i should have to walt so long before starting researching myself. Ten yeara ago, I started computer translation reaearch as a hobby and I have puraued it ever since with the same sort of dedicated enthusiesm which some people give to bridge or chess, i have been allowed free computer time by a number of different business users to the extent of about ten minutes a week throughout the parlod,

and I am most grateful.

i have always had as my first major objective the translotion of business correspondence, i am employed in business and am familiar with business correspondence. Among Ite advantages from the research point of view, two are outstanding: the relatively simple sentence that in officea people are accustomed to modifying their procedures in order to make them more readily acceptable to computer operations. This is

absolutely essential in language For full details Including syllabus On the other hand, there are end booking form ring limitations. Programs and storage space used must be mini-mised and the results must be accurate. These and other

adopt an approach to computer translation different from that of YOU ARE ADVISED TO BOOK EARLY. other researchare. AS THERE ARE ONLY 12 PLACES PER COURSE

10 Dover Street London W1X 3PH 01 - 499 4501

WALTER GOSHAWKE, cheirman of tho British Computer Society Netural Lnn-guage Trenslation Specialist Group, writes about the research which has been going on into language translation over the lest two decades. So little hes bean echieved, that meny paople think the tesk en Impossible one.

Are they right? By way of enswer he describes his own fescination with lenguages and the work he hes done in

Goshawko ndds, "I hope to de my rosearchos during my rathrement mil olso hopo to persunde others to take the resenrch, both in England and ingle countries."

He hopes that many people we become sufficiently interested to tell the research, end that language time tion probleme will, in dua count, h feetured regularly in the computer Press

remilents in other county

through computer translation Not only does this give main

to the research, but h to

enables them to test surp programs in real life cooling

hefore embarking on me

So much for the imports differences between my syn

and that of other resembs.

Any reader who has followed at

so far will want to know state

success I have had he

earliest programs, I used for

lish, French, German, line

and Norwegian languages at

of simple sentences in al

them. The programs are

longer in existence, per

because I used a now obvide

programming language ri

ming techniques.

niroduced different progra-

prickage which translates single

All that is needed is

more work on te-

search, none of

which is particular

very interesting.

difficult, but all of it

English sentences into Gerove

It is intended for the use of othe

researchers who want to av-

the system. The programs of

unly perform the translation

int they also provide details

explanations of all the pr

grunning methods. The pe

gramming language used it

very elementary subset 6

Cobol, which is easily learn!

is readily adaptable to E

I shall be pleased to supply

maynine interested a copy of

unpublished paper i bi

cription of the system

details of the package associa

I hope to continue my res

ches during my retirement

this of course depends on her

time. I also hope to perso

others to take up the reserve

both in England and is oft

countries, it will then be post

to begin computer pender corruspondences with first

Judging by the interest the in the regular puzzle pig computer Weekly, plent is

computer people seem in willing to handle guzzler

tics, chess and playing con

So for, I have never sen it

references to compute the tion problems, of which in

tion problems, of which a rich variety exists, I am had that many people will be sufficiently interested to the them, and that language them, and that language them, problems will, it is course, be featured reported.

computers on a

Mony others are and

computer art.

canquiter which uses Cobol

obtained accurate train

"enteli". If you entell a hird, a mouse and a cat, you need only une verh. If you catch a train, a batterfly and a cold, you need three. Similarly, programmers in the peculiarities of their respeclive inngonges, und program

meanings such as man, office and so on. Each has defined accurately in all spoken longuages using the

word with two different anings in English or in any other language must have two different NLnumbers to repre-

Other NLunits provide inforprograms hove been written for

The dictinnary is a very Important element in the system. Apart from the fact that many words in may spoken language huve a variety of different occanings, there is the problem that many words in spoken languoges do not have exuct equivalents in afficer

This is why the Number Language version has to be the official version and why every NLnumber has to be defined in every spuken language. This menns that sometimes un Number can be expressed in nne word in some spoker Innguiges, but requires several

words in others. The creation of the dictionary is a very lengthy task and it is proposed to undertake it in stages, each of which will be clearly defined and munifered. The dictinnury for husiness currespondence will be one of the curly stoges and will probably cunsist uf netween one

whatever the destination of the can identify which stage of can limit the storage necessary for the dictionary.

The writing of programa, too, is a lengthy task and it is also graded. In this case, according to difficulty.

Thia feature is particularly valuable fdr reseorchers. It enobles them to know what stage they have reached com-pared with Other users and researchers, and makes possible the exchange of messages in Number Language with other. users at the same stago in other At all levels, eccurate transla-tions are obtained. Thus at a

very early period researchers

LONDON Oarek Blakemore 01-261 8454 061-872 4211

Owen Kelly 061-872 4211

Appointments

021-356 4838

With at least two years operating experience, our range of contracts could give you what you're looking for next in your

French-speaking IBM OSJCL writers. Long-term contract, starting September. Attractive salary and attractive setting-

or further details on advice on these and other contracts still

Operators

IBM OSVS1 Ops

Europe

IBI4VM 370 Ops..... ICL SYS 48 2900 Ops...

ICL GEORGEIII Shilt Leader......

Banking Systems

c.£8000 West London

£5000-£6500 Surrey

Graduate to £10000

In Paris and N. Africa

Are your Systems Analyst with banking or data communications

experience? Work for a major manufacturer on expanding linear rat product cange. Ref. JP/149 London

Systems Consultant/Analyst

To be responsible for pactage lesign and implementation for new and existing but our customers. The ideal programming bact ground is Basic Assembler on 360/370; systems experience should include full project responsibility. Your

Dack ground should include some bureau/software house involvement. **Ref. JP/150 London**

LONDON 01-261,8174

Sussex

Gulldford

Knight Contracts

....London

......Kent - long contract, top rates

MICHAEL WHITE 01-261 8028/8658

Total system engineers the new elite By C. E. Allen

training of computer ser- and a new algulficance during division's training centre computer technology has team to assess training been extended to simplify communications between man and machine and pro- of the development produce systems which can be used simultaneously by many people for diverse

systems designed to meet these objectives is, in many ways, more complex than that of their predecessors and this necessitates changes in training to pro-

The role of hardware nud puter is not as clear-cut as it was in the early days and some functions previously controlled by one technique are now controlled by the other, or by a mixture of

integrated circuit technoprinted circult board or

hardware components.

meet this requirement.

formed from the best gain proficiancy on a lault diagnosticians in the greater number of comcompany who will set the puter devices, to progress required standards and to the more complex parts systems angineera of development staff to iden where sophisticated test alite of the computer system.

THE recruitment and which affect maintenance nostic techniques are used serviceability. and some of these engla-Lecturers from the eers will eventually take responsibility for the mainthe past few years as have been assigned to the tenance end repair of major computer systems in use on

> Close llaison with engineering management in future, much wider training experience gained over many years has led to the

planned schedule which is capable of diagnosing com- made known to all ICL plex system faults through customer engineering the use of the customer's departments throughout

undertaken at the truluing

with computer systems

worth approximately £2,500,000. These are con-

tinually taken opart, re-as-

sembled and run by slu-

dents trying out the new

With iCL's products now

skills they are obtaining.

direct from univarsity.

Training plays an important role in the carear prograssion of all ICL cuatomer sarvica enginears, of whom there are now more than 6,000 worldwide. Hara C. E. Allan, menager, Customer Enginearing Division Training et ICL, describas tha company's training echama, and says that, by dadication end hard work, junior antrents can bacoma tha total systams angineers of tomorrow, end join the naw elita of the computar aervicing

than 6,000 worldwide.

Although some courses

More than 20,000 student weeks of training is provided annually. Over 40% of this is devoted to ongoing training for existing aervice
engineers according to
their skills and ambitions,

A project team has been dealgned to enable them to on course content.

development of a modular training scheme.
Each module is of no more thon cight weeks' highly-trained and mobile duration and is run at group of system service regular intervals to a

> There is a high practicni content in all courses

are designed ao that they can be undertakan by engineers while working in the training is provided at Instead, error manage the division's extensive ment and recording faci training centre at Letchworth which employs more than 80 lecturers and 30 the approach to the major- development ataff and of fallurea is vla operates on a budget of £2

Because of recent expansion in iCL's overseas ex-servicemen with releprogrammes. operations, around 3070 of those attending courses at those attending come from engaged on resolving faults Letchworth now come from this nature require a abroad. Additionally, Junior entrants with "O" knowledge of the total jecturers are travalling level qualifications in ovarseas to giva courses to aervice engineera in thair own countries.

Systems Support Senior Programmers up to £7500 London up to £4200 Midlands

for audit procedures; new computer thased audit techniques – as a major into national according him, these are some of the ferelopments our client is expecting from his new torbuical support group. As a member of that group, you'll need around to year 10Pro-percence including commercial applications, systems and software development, COBOL programming, IBH operations you missing ICL, Ref. JP/14B Lendon

Systems Analyst

minded analyst to set up a capro of communical systems based on a real-time mini. For a young analyst whose self-confidence. is based on proven ability, this it a rare ground-floor opportunity with a lot of potential. **Ref. B/126 Birmingha**

COMETO NOTTINGHAM AND GO PLACES

A US-backed manufacturing company whose markets include: the motor industry is starting an exciting phase of development and expansion - especially in the DP field where future projects could include the establishment of a data centre network. All these appointments are crucial to the Company's future plans. The present configuration is a 1902T operating under GII, with programming in COBOL or PLAIN.

Senior Programmer

Withat least two years programming experience, and one year in analysis. You should already have at least one major system to your credit. This is a great opportunity to learn new techniques, implement fresh ideas. Ref. B/127 Birmingham

Systems Programming Manager

c.£6500

analysis experience should include stock and production control systems. You will also have a full understanding of As a project leader now, you should be ready to lead larg projects still, Ref. B/127 **Elemengham**

Knight Computer Services Limited

For a better tomorrow, act today. To speed up your application or to get information on opportunities in the

subjecta are taken in esch year on a four-years spon-Guilda qualificatione in computer technology. the Stavenage College of Further Education willa the practical experience la gained at the Letchworth training centra and by Industry Training Board sponsors the course and exercises a strong influence By dedication and hard work the junior entrants of

Computer manufacturer seeks French-speaking computer science graduate to train as a systems engineer - trouble shooting on business and technical problems. High salary, tax concessions, travel, experience - what more could you possibly want In your first job? Ref. JP/152 London being sold in 80 countries, there is an increasing requirement for trained service enginears. Consequently the company **Analyst Programmers** recruits personnel at sever al levele. Thay include Time sharing package development existing service engineera number of new packages for management information processing in a commercial time-sharing environment. If you have a degree or equivalent, 2/3 years programming experience (principally in Fortran), and you're familiar with mathematics and scientific

could be in at the start of a venture with big market potential. 01-4914706 Knight 021-772 8331

n"		HULL	rrep:	er,	'nż.	ule	COU	ihoi.	N O	- 349				6.40	' a.E.,					77 B		٠: ز	415.00	1	۲.,	676 -		Sale.	1.	
1	:;	Nan	ne		1	· 10 ',	ji.		' '	: / ²⁹ .:		أدير		i de la companya da l La companya da la co	ارا مومان د		Ai	a dr	ef :		,	y i Garait	de.			i Ji		1.	7.3	
		10 .	ress	177	7 Y	11.		. 3		Ψ.	1					91	Nü	mbe	raf	yeat	aex	Der	ience	ın.)., -1208-	1			Н
	:			١.		1		11	->-	7 %		2 to 100	0.0	114		1	Oc	erati	inė i	٦-	Pr	Off	imm	irel		M	1717	4.5	~ 4	11
	Ċ,		۲.	75		. دوه	4				(d.)	()	وفر الأ	174.61	'n,	17	Op An	alvsl:		- 1	ľИ	i Č s	¥.ii	1		ή,	177	$q_{\rm T}^{\prime\prime}$, d
N		7	(hol	TF.			1	77	17	1, 2	\mathbb{Z}_{2}	755	1.15	(61) (1 (2)	11*	r 1	~5.6	Altra in	enci	lred	1	1 7	177	P	7		1	7	1 411	33
3		110	(Wo		1.			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			· F	4	: 3	1		904	P		rior	i i	, ir	Arit	i an e	i P	TË -	ch	n ira	41	44.	Ϋ́
II.	9	161	Links			enjes Vie	[]	' V'I	الشبا	ry ryg	100	7	V	1.1	7.7	149	4			1, 1			4		ابي	Υ.	7.	**		

S.N.A.

Hutchinson-Scoggins announce the 1st S.N.A. Internals course available to the public

This 5 day course is designed to tell systems programmers what S.N.A.

date: 3rd-7th OCTOBER 1977 venue: EUROPA HOTEL LONDON W1

> Brian Burch on 01-499 4501 or write to the address below considerations have led me to

> > Among the most far-reaching differences are: removal of ambiguities in input; universality; accurecy of definition of all details; stages of vocabulary and grades of difficulty.

with ambiguities of a number of and have become so familiar kinds, most of which are that users do not think tham resolved almost subconsciously peculiar at all. Nevertheless, the In the human anylronment by an programmar must learn what examination of the context. If they are and make allowance for unedited texts are presented to a them in his programa.

means that the computer program will often have to examine the context to ascertain which of several possible meanings is intended. The examination of contexts by computer is a formidable task, it Increases enormously not only the complexity and length of programs, but also the complexity end size of the dictionary necessary to be

Moreover, the results can never be wholly relied upon. ms are the worst problem, ldioms known tu the programmer can be included in the program and there are many eds of them. In human speech and writing, new ldioms are always occurring, and when first met with are frequently not understood. Thus programs for

complete and reliable. This type of progromming cannot be contemplated for business correspondence, My programs do not examine contexts. If there is an ambiguity they either make an assumption and specify what it is, or produce sn error legend and proceed

searching contexts can never be

with the translation. All Idioms except the commonest have to be rewritten in simple English before being processed. Thus the computer would make an ossumption in tha case of the sentance "i have written instructions," but "i have put this job to bed" wnuld have to be re-written. In practice most businesa correspondence is unomblguous and simple in

styla, so this is not likely to be a For business correspondence lt le necessary to hove a system which is valid for oil spoken lenguoges. I have epeciully devised on intermediate languaga and the intention is that oli

messages shall be sent and received in it. Moreover, all measages in the Intermediate languoge are unambiguous, and tha intermedlate language version of the message, once despotched, becomes tha official version. The aome sets of programs are valld message sent out or whatever

This system both reducea enormously the emount of programming necessary and minimises the educational needs of the programmer.

For business correspondence it is necessary to have a system which is valid for all spoken languages.

English, in common with other spoken languages, has many peculiarities which are not sultable for inclusion in an Spoken languages abound with ambiguities of a number of and have become so from the special and th

Business correspondence

must be accurate; otherwise it is useless. I have mude accuracy in nll details an Important feature This language is called Number Language and consists entirely of groups of ten-digit units or NLanits. Most NLunits contain Number Language numbers or NLnumbers which have dictio-La be

sent it in Number Lunguage.

mation about the nature and length of sentences, or indicate which of the NLunits represent the verb, the subject, the object of the sentence and so on. Thus a Number Language message can be translated necurately by computer into any spoken language for which elfleient

and two thousond words. The Ilmitation of the voenhulory for any particular jurpose reduces the scope for nunbiguities and is very vuluuble. It alsn has the advontage that if users vocabulory they and their

This does not, however, menn that rigid restriction of vocabulary must be practised in oil circumstances, if on occasion additional words are necessary. a list of these can be oppended to

course, be reature the computer Press.
On the question of more computer transfellor is not my answer is yet feel in system is flexible enough is system is flexible enough is system in the course of accurately with a complex statement that they are unlook Includa no idioms

grammes will ensure, in the on system architecture, hardware. micro-coding and operating

requirements at first hand.

Current implementation

The result will be a engineers who will be

Additionally, due to miniaturisation of components and the use of micrology, it is possible to pack a very large number of circuits, and thus computer

Consequently, the days have gone when a hard-ware fallure could be diagnosed by an engineer putting a test routine on to the central processor and by "stepping-through" to the

Ities are incorporated in the system software and software operating syssultes of test and diagnostic

em - not just its

ICL's customer engineer ing division has recognised the need for service angin-eers with an undarstanding of the total computer system and the division's recrultment, training and carcer progression pro-

produce engineers capable of diagnosing faults via the advanced operating syalems employed on large applications of technology, and one-quarter ralates to the training for evileting angineers is

grammes are structured to one-third of it covers trainin particular, ICL has products and modifications recently set up a training to exiating onea and and davelopment acheme to changes in maintenance

tify system characteristics equipment and fault-diag vicing industry.

functions, into a single tant role in the career progression of all ICL customer service engineers centre which is equipped who now number more

million a year.

Knight Recruitment customers' premises.

computer part ages for client use; tile interrogation pact ages Hajor motor manufacturer needs programmers - ideally

graduates - to work on mainly linancial applications, often under right dearline pressure from ill work in PL1 or n 370/158 operating under CS/VS, tour'll have at least four years PLI experience, in heling two with if IS DB, and one if a more programmer level Ref. 8/124 Birmingham

£4500 West Midlands A successful, multi-location engineering company with a recently-created DP department is looking for a business-

Analyst Programmer/

£4500-£5000

Your programming background should be extensive, and should include COBOL and PLAN, and your equally extensive

The Staff Services Division of BOC Datasolva Group and a mamber of Sa Computing Services Association

hutchin/on-/coggin/ technical support

THE BENEFITS

Whet we are offering is:

challenging work

early responsibility

- relevant training



Timesharing Salesmen

c.£9000+ on quota plus car A large international company is expanding ite timesharing services and

requires salesmen to cover the London and Home Counties areas. Applicants, male/female, should have a successful record of selling computer services, or hardware, to both large and small organisations. A commercial computer or accountancy beckground is desirable since part of the job is selling solutions for business problems. The timeshering service and support functions are well established and have a reputation for quality and customer satisfection.

Since the group has planned substantial growth for the next few years, both in the U.K. and on the Continent, this is an exceptional opportunity for someons looking for e challenge and career advancement.

Excellent solaries and fringe benefits.

Contact: Jim Baker

Consultant Information Retrieval Systems

Neg. c.£7000 One of the U.K.'s most established consultancy's wish to appoint a consultant with experience of computer information retrieval systems. The company is looking for someone with a computer background but who has been deeply involved in the implementation of a system in a library or documentation centre. Candidetes should have some knowledge of at least one proprietary peckage in the field, such as, STAIRS, STATUS, DIALOG, or ORBIT. Applicants will be expected to have the persocality and communications skills to carry out client projects without detail supervision. They should elso be able to contribute to the continuing development and marketing of peckages end services in this aree. This is on opportunity for the right person to join o stimulating company. with variety of work and good staff benefits.

Contact: Margaret Stevens

Analysts and Programmers Berks.

up to £6700 Our client, part of a lurge company operating worklwide, has immediate

requirements for staff to join new development projects. Candidates must have a commercial background in linance, accounting or payroll. Analysts should have some experience in finance plonning and programmers must have at least two years of COHOL on o large mechine. Above overage salories and opportunities.

Contact: Jim Baker

Analysts and Programmers

up to £8000 Our client, part of a large well-known group, hus vacancies for Analysts and Programmers to work on the development of real-time systems using new techniques and hardware.

Senior Analysts and Analysts must have several years experience in commercial applications, such as accounting or merchandising, and be capeble of controlling project teams.

Programmers and Senior Programmers must have nt least two years using COBOL in an IBM instelletion.

The future d.p. plans include chollenging developments which can offer attrective careera Salaries negotiable occording to experience. Generous fringe benefits.

Contact: Jim Baker **Programming Team Leaders**

Neg. to £5000

Applications are invited for the above poets from persone who consider they can make a worthwhile contribution in a professional team environment. The positione require the ability to supervise and control the work of programmers and designers in the development, implementation and support of commercial packages. Candidates should have at least three years' COBOL programming background and preferably with some supervisory experience. Excellent working conditions. Solories in relation to experience.

Contact: Margaret Stevens

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above poeltions but you are seeking other opportunities please contact us anyway.

> JAMES BAKER ASSOCIATES **International Personnel Consultants** 16 Maddox Street, London W.1. Tel: 01-491 4478

CITY OF DERBY

Principal Computer Assistant

Grade P.O.1(3) £5,512-£6,097

including £520 salary supplement The successful candidete will be required to control and develop the systems end programming function in respect of new end existing epplications from identifying users' requirements to successful implementation and meintenence.

The duties include preparation of reports for Management Team and will involve deputising for the computer manager in

Wide systems and programming experience is required, preferably on ICL machines and in local government, together with a relevant professional qualification.

The Council operates a 49k ICL 1902S installation running extensive real-time local and ramote V.O.U. besed systems. Generous resettlemant axpenses will be paid in eppropriete

Application forms and further details may be obtained from the City Transuror, Council House, Cerporetion Otreet, Derby DE1 2FE. (Oerby 31111, ext. 819 or 929). Clesing dats Friday, 9th September, 1977.

Ashford Borough Council

Systems THE UNIVERSITY OF SHIFFIELD DEPARTMENT **Analyst/Programmer** OF ELECTRONIC AND

required in a unit operating an ICL 2903 with discs and tapes on behalf at Ashlord Borough Council and Shapway District

A minimum of 18 months' precticel experience in COSOL is essential with a knowledge of PLAN an additional advantage. Systems training will be provided if necessary.

Salery £3825 to £4095 plue supplements of £312 plus 5%,

Excellent conditions of service including: --100% removal expenses

 settling-in ellowance
 council-accommodetion or essistance with professions fees for house purchase in Sppropriete cases,

Application form and job description obtainable from the Chief Personnel Officer, 14/18 Church Road, Ashford, Kant, tel. no. Ashford 24411, axt. 244, returnable by 19th September, 1977

Chief Programmer

New Applications

New IBM 370/158 Installation

Our client, an extensive user of IBM hardware and software, wishes to recruit an experienced OP programming professional to be responsible for providing depth loch-nical experiese, offeri and service in the development and implementation of wide ranging systems utilising advenced techniques and methodologies. This is e new appointment reporting to the Manager, Technical Support and Advanced Systems.

The auccessful applicant will moethed technical design thinking on a broad applicant on from the design thinking on a broad applicant on from the design thinking on a broad applicant adviacy our poets on the benefits, implications and mortin or utherwise of the introduction of rolevant technical concepts and procedures.

You are probably cround 30 years of age, possess a sound background of experience in applications solventu design, development and implementation in an IIIM 27t, 118, VN, mixed high level enumerical language environment. Experience in interactive program lesting would be advantageous.

The group offers necessity via the nature of its expanding husiness activities, attractive frings benefits, nignificant coreer prospects in line with long term development plans, and an opportunity for accessional travel to the continent. An attractive shriting misry will be negotiable and it is unlikely that applicants currently enraing less than \$2,000 p.s. would passes the level of experience required. The location is in the Northern Home Counties rured erren, with easy across to London (1 haur). Relocation expenses are negoticide and the grounding.

ilicanis, mele or femelo, should tolephone or write for further details, in nirict fidence, quoting Reference Number (1478, to Teny Spurr, at the eddress below.

BIS Applied Systems Limited 79-80 Blackfriars Road London SE1 8HB Telephone 01-928 9511



ELECTRICAL ENGINEERING

Appications are invited from man and women for the post of Programmer in the nova Department. I create to it is months and abonatored by the Nutfield Foundation. The person appelling will be required to york on the development of Computer-Bessel Assessment Programs for first year injectionie land attentical engineering under-graduaties. Applicants should be graduated with the special programs for the programmer of the programmer in the programmer of the programmer of the programmer and programmer in the programmer in the programmer in the programmer in the programmer of the programmer in the program

research would also be slary on OR Grade IB, up to

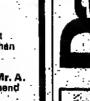
DATA PROCESSING MANAGER

all ectivities on our I. 9.M. System 3, Model 12. Applicents should heve at least three years' previous experience in D.P. Management in which their responsibilities should have covered the implementation and specifications of mejor new systems. Experience of direct date entry perelions vie V.D.U.s would be advantageous:

It is anviseged that salery will be attractive to the right epplicants but it is unlikely that anyone earning less than £5,500 per ennum will heve the relevant experience

If you wish to apply for this vacancy, please contect Mr. A Tucker, Personnel Manager, who will be happy to send

INTERNATIONAL RECTIFIER IOR HURST GREEN, OXTED, SURREY, RH8 988 Telephone: OXTED 3215



An expanding cityoperations environment

potential a extent the company's operations and abigit into reduces the self or both men and women, especially a bother hybridation of the 2000 range is planned

Technicai Support Officer

Applicants that I know a good I nowledge of ICL 1800 Software, about you and in 1900 Operations, and also led of George 272 I. Proference will be given to those applications of the control of the contr with experience in Cobol/Plan, Communications, and 1900 packages.

ICL multi-processing environment, with a working knowledge of George 2/2+. A four-shift system is in operation, and there are excellent promotion prospe All appointments carry competitive salaries and in the benefits package. Write with personal and career delays. J. P. Bayley, Personnel Officer.



BOC Datasolve Limited, 88 Old Street, London EC (V 9PX

PROG. AVAILABLE

installations throughout the country, is seeking additional experienced Operations Personnel to join the ICL sector tes land out fly hat wenter. His is an important and high

Important aspects of the Job are: Devidopment and amendment of macros: I faintenance of George 2-4 operating system and Interface with software development.

Senior Computer Operators



LL CAPITAL APPIS. MACRO 11 RSX 11 01-560 5587 (Eves.)



TRIAD Computing Systems Limited

Guildford

TRIAD continues to expand. Our London operation has been growing larger. We are now starting our first out-of-London operation in Guildford which will be managed by Dr. Keith McKenzie. We are therefore looking for high quality people to form a nucleus for this group. We also require more people to be based in our London office.

We have already made our name in minicomputer systems. We are also building up a solid business in microprocessor systems - hardware and software - primarily in industrial automation. Our European involvement is growing profitably. Less headline catching is our continuing work in commercial systems, mainframe program development, hardware selection and high level consultancy.

GUILDFORD

Early project work will

- database development
- text handling
- linguistic programming
- control and application software for mini and microcomputers

THE COMPANY

Continuing requirements include:

- commercial systems designers
- experienced project up to £6,500 leaders
- competent programmers willing to exploit their talents in a structured
 - up to £4,500

up to £7,000

up to £6,500

– specialist consultants in appropriate areas

environment

- travel loans

- bonus

Write, or ring: Erwin Schneider

TRIAD Computing Systems Limited, 1 Dorset Buildings, Salisbury Square, London EC4Y 8ES. 01-353 6323 Associated Operations in Belgium, France, Germany, Italy and Switzerland

OROUGH TREASURER'S DEPARTMENT Programmer

Up to £4.500 p.a. inc.

We need a Programmer, with at least two years COBOL experience, to join our Systems and COBOL experience, to join our Systems end Programming Oivision, using moduler programming and GEORGE 2+. The successful applicant will be in the Planning and Technical Services issem, and will be involved in new areas of development.

Opportunities exist for an ambitious person to gain experience in the Systems field.

36-heur, 5-dey week, with flexitims in operation.

Application form and job doscription from Parsonnel Officer, Town Hall, Forest Road, London E17 4JF. (Tel. 01-531 9999, 24-hour answering service).

answering sarvice).

Closing data: 16th September, 1977 Please quote Ref, 9,994



DATA PROCESSING MANAGER

We are a leading multiple retail organisation beard in caniral Woking and se a result of considerable year. In 1971 we were treding from 177 brenches end we ere now trading from 370 branches throughout England and Weles. We enticipate that expansion will continue et the seme rate.

We wish to recruit a manager for the Inetallation immediately in order that the successful candidate can become fully conversent with the present system end ba totally involved in the introduction and operation of a new in-house lastellation.

Previous experience on a 2903 installation together with a sound knowledge of commercial eyetems, project menagement and the implementation of new system leads of new syste

SALARY circe £5,000 Contributory Pension Scheme 4 weeks ennuel holiday

Please write giving details of current employment and previous experience to: Irane Foster

NSB Newsagente Ltd. Ryde House Chobham Road Woking GU21 1JQ

COMMUNICATIONS

370 PLI + Assm. MICROPROCESSOR

SOFTWARE

to £6000

to £5000

PRINCIPAL PROGRAMMER SENIOR PROGRAMMER

FULL RELOCATION EXPENSES KENT

communications projects in the world? Our client, a world leader in telecomms systems, is just starting a project to develop a major new product. The system is based on multiple microprocessors and the control software is to be produced using a highly intelligent software generation system running on IBM 370s.

Are you interested in joining one of the most advanced

A Principal Programmer is required to lead a small team and take responsibility for a sub-project. He will develop a simulator for the microprocessors to test the software on the 370s. The person required must have good 370 knowledge and simulators or RT systems would be useful.

A Senior Programmer with some PL/I or Assembler experience is also required to work on this exciting project.

Experience gained in this environment will be applicable to major communications systems throughout the world. There are excellent career prospects and an extensive product development programme in this multinational software development centre.

RW 35/1

hutchin/on-/coggin/

10 Doyer Street, London W/X 3PH Telephone 01/499-4501

LONDON BOROUGH OF ENFIELD

Senior Systems Analyst

£5494-£6055

Applications are layited for this post in the Borough Treasurer's department. Applicanta should have a sound background in programming and systeme analysis and some years experience in Local verament or commercial data processing.

Application forms ere obtainable, upon receipt of e foolsosp s.e.e., from the Borough Treasurer, P.O. Box 54, Civio Centre, Silver Street, Enfield, EN1 3XF. Closing data 16th September, 1977.: Please quote reference ORA/994.

NORTH WEST THAMES REGIONAL HEALTH AUTHORITY

COMPUTER CENTRE: PROGRAMMER

required to work on Hospitel Activity Anelysis and other Applications: A minimum of 1 year's programming experience, preferably in ICL Cobol is desirable but

The Computer Centre is an attractive modern building standing in its own grounds in New Southgate and the equipment used is an ICL 1904S with communications.

Salery Scale, (Senior Admilhistrative Assistant Grade) 63,634-64,844 per annum plus £354 per annum London Weighting, Eamings Supplement, Stage I of £31/2 part annum and Stage II of £208 per annum are payable in

Application forms and further particulars obtainable from the Regional Resconder Officer North West Thanks Regional Health Authority, 40 Eastbourne Terros, London W. 2017, Telephone No. 01,282, 801; Bit, No. 261) quoting reference indinter 192, Closing date 18 September, 1877

"EXCITING SYSTEMS OPPORTUNITY" **SOUTH MIDLANDS** SYSTEMS ANALYST SALARY CIRCA £3,850 P.A.

package to standardise payroll procedures. They are currently undertaking some of the most sophisticated systems dayelopment within the UK utilising both large IBM 370 series mainframes

Our client is seaking a Systema Analyst to work within the Cantral Payroll Section which is the focus for other Payroll Sections within the UK, providing a cource of expertise and control in the process of standardisation, centralisation and maintenance of payroll systema.

- at least three years' systems analysis experience, some of this time to have been apant ideally on payroli applications
 a dagree of equivalent qualification
 a proven record of auccess in handling projects from faasibility through to implementation within a large expenses.
- ithin a large organisation.

PREFERABLY

- a detailed knowledge of UNIPAY
 a programming knowledge (ASSEMBLER).
- This is an excellent opportunity for a Systems Analyst to become involved in a position of interest ond responsibility within the areas of payroll and payroll related systems.

Excallent fringe henefits are what you would expect from a large major manufacturing concern and include a recently updated pension scheme, and facilities for car purchase at extremely advantageous terms.

CONTACT REG HEATH ON: 021-236 3781

REF. NO. 77/09/4

REAL-TIME DEVELOPMENT **WEST LONDON** ANALYST/PROGRAMMERS & PROGRAMMERS SALARY TO £5.500 P.A.

Our client is shortly to install recently released current generation hardware to service, through this central location, its UK operating companies.

There is a substantial development work-load to incorporate the use of on-line facilities and these positions will appeal to those persons wishing to play a key roleing small developing installation in a newly formed team of Data Processing Professionals.

You must have:-

- ★ good COBOL experience
- * commercial systems understonding
- * Analyst/Programmers will enjoy a balanced systems/Programming job

All these positions carry annual bonus, profit-sharing and other useful benefits.

CONTACT LONDON OFFICE: 01-935 0671

REF. NO. 77/9/5



SENIOR SYSTEMS ANALYST

end eppropriate supplement under Phase 2 of the Government's Psy Policy for an exparienced computer The London 9 orough of Marton requires an additional operator for its computer installation at the Town Hell, SW19 (adjacent to Wimbladon Station).

The contiguration comprises e 94K 1902T with communications. A shift system is in operation spanning the period 0700-2200 hours Monday to Friday with occasional overtima including weekende. Shift arrangements are subject to reviaw. The succassful applicant will be appointed within the salary stated according to experience.

Legel and removal expenses in appropriate cases, toans for annual season ticket and generous holiday antitiament.

Computer Operator

£2,724-£3,450 + Shift Allowanca

Application forms from Borough Traecurar, Town Hall. Wimbledon, SW19, Tel. D1-949 8070, Ext. 329. CLOSING DATE: 19th September.

SYSTEMS ANALYSTS

An astablished firm of management consultants, members of the Management Consultants Association, needs additional computer people with a good commercial systems background.

Assignments are varied and Interesting and cover a wide ranga of industries and applications. There is the opportunity to travel, to develop skills and experience

Candidatea should have a dagree or comparable professional qualification and be agad 28-35. In addition to a good salary and range of other banefits the positions offer an excellent opportunity for career

Plaase apply Box No. 1885; Computer Weakly

COMPUTER SERVICES UNIT DEPUTY COMPUTER

OPERATIONS MANAGER

£6209-£5512 (includes supplements)

A Deputy Computer Operations Mengar is required for the County Computer Services Unit. This is a vary asponsible post, having management responsibilities for a considerable number of etail. The central computer is on IBM 370/145 which is connected to a lorge terminal network for batch and direct acquire operations. ants must have experience approprieta to the job. -

Application forms may be obtained from the Director of Computer Services. Reed. House, Corporation Road, Middlesbrough, Claveland, to whom they should be returned by 18th September, 1977.

3 1 m

An exciting opportunity has arisen professional to play a leading role in the development and implementation of a range of date processing systems to aid the automation of our company's

internal businees processes. Mambrain is a young, rapidly davaloping company, angegad in the dasign and manufacture of highly sophisticated Automatic Test Equipment for use within the alactronica industry.

This is a challenging opportunity olfaring considerable ecope for career advancement. Education: probably to dagrae etandard or aquivalant. Savaral years systems experience in a manufacturing industry is also assential. prafarably involving production of materials control. Additionally, some O&M experience would be an

Our long-term objective is the lavalopmant of an integrated system covaring the company's major business procedures, based on an in-house minl-computar. Direct experience in this area would therefore be a further adventage.

In addition to a highly compatitive salary, we offer a number of company benafits. Relocation costs will bo raimburaad where appropriato, to assist you in moving to this attractive eroo. close to the emenities to Sournemoull Why not talaphona Conald Crawlord now, on Farndown (0202) 893535. Or write him a brief note requesting further information and application form.

Mambrain Limited Farndown Industrial Estate Wimborna, Ooraat 8H21 7PE



Systems

With the recent installation of our new Honeywell 62/40 we are looking towards strengthening our well esteblished date processing team.

Candidates should have had at least two years experience with a disc based computer system. An attractive selary will be offered plus all the benefits

associated with a major internetional company... For further details please contact Mr. R. G. Mertin, Date Processing Menager, AEG Telefunken (UK) Ltd, Beth Road,... Slough, Berks Tel: Slough 872522.

AEG-TELEFUNKEN (UK) LTD

Eaton Lumped, countriences of Yalo For M Tracks have the following vacancies

Senior Systems Analyst

£5,000 INCL COLA AND THRESHOLD

Good commercial background, abla to liaise with top management. Will be insanly involved in the medification or in-design of centant systems, due to a schodolistic bringe of hurdware which will. nocussitato changus to systems philosophy Current configuration system 3 on lina to IBM 370 / 1511

Plummal confuguration IBM 3790 on line to IBM 370/16ti Senior Programmer

£4,600 INCL COLA AND THRESHOLD

3 yours' critical essentiat. Knowledge of J.C.t. and interprecussing insting IBM 370 would be of

Will be been in the division programming for 370 in the beauty control out the system 3 at the division. The letter to be replaced by an IBM 3739

Data Processing and Controls Supervisor £3,600 INCL COLA AND

THRESHOLD

To be responsible for data preparetion department and computer department. With be required to feet with users and maintain standards of operating and the control of the c ala entry. Exparanca essential.

Plaase write or talaphone for application form Parsonnat Managar, Eaton Limited, Materiels Handling Division, Watdans 9rook Lens, Wednastield, Wolverhampton WV 11 35W Talaphone: Willanheil (0902) 99955

FAT • N Materials Handling

SHIFT SUPERVISOR c £4500 p.a. IBM ÓŞ JÇL London. no 01-439 6481





PROFESSIONALS

BEDFORDSHIRE

REAL TIME SYSTEMS

SALARIES TO £5,400

Our Bedfordshira based client serves a group of compenies. They have centralised their computing activities around a large IBM 370 series mainframe using CiCS teleprocessing for real time development.

This has created capacity for further extanding its date processing work. They therefore need to recruit additional key systems enalysts who will be involved in major projects. These include on on-lina booking system, stock control/movement and comprehensive accounting systems.

* An analytical approach to problam solving.

* Preferably some experience of systams design, having worked in an Analyst Programming

A commitment to data processing, a real desire to move into systems analysis and be involved in the business.

There are excellent promotional opportunities to advance to senior systems positions, with salaries in excess of $£5,400\,\mathrm{p.a.}$

The company offers FLEXITIME, EXCELLENT WORKING CONDITIONS, FREE LIFE ASSURANCE and RELOCATION ASSISTANCE.

Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

* The ability to communicate effectively with all levels of management.

Make a move in the right direction end contact:

SPECIALIST COMPUTER RECRUITMENT LTD.

BIRMINGHAM 021-236 3781 FREEPOST

MANCHESTER 061-833 0676 FREEPOST

LONDON 01-935 0671 FREEPOST 6 Freepost 6, 102, Blandford Street, London WtE 1JZ

Freepost, Corn Exchange Buildings, Corporation Street, Manchester M48BD

West London

£5,000

Our client needs a person-capable of taking charge of a minicomputer to be installed early next year. With the backing of group specialists and e software house you would need to be able to:

Assist in installation planning Set up files Set up procedures and controls Supervise routine operation Train hands-on VDU users

You would also be expected to spend a couple of months learning about werehousing and distribution. if you can tackla this challanging and rasponsible job it could be your career take-off point.

Send career deteils to David Torvall et our London office, quoting reference DT/348.

Ivor Norton Management Services Ltd

P.O Box B3, Conthiell Tower House, Harrogate, HG1:1TS. Tel: Horrogate 66628. 95/B7 Jermyn Street London, SW1Y 6JD.

SCOTLAND & MANCHESTER SALES EXECUTIVES

Base salary c6k Quota earnings 12k + Company car

Our Client is an international Company with a large, well-established cuatomer base in the North of England and in Scotland. The product range covers key-to-disk, shared-logic word processing, and distributive processing systems. The products are noted for their technical excellence, and have been well accepted.

The Company is launching a freeh sales effort in the ascribed areas, and requires two mature, experienced salas professionals to develop its existing customer base, and to promote new business sales.

Candidates must have:

* good salas exparience and attendant success in the areas of at least one of the following:

Key-to-usk
Shared logic word processing
distributive computer systems

a high level of technical self-sufficiency
a current real understanding of the gengraphic markets defined.

These are unique opportunities for high earnings in a situation with enormous scope for a sales professional who wishes to join a Company on a major re-launch programme.

CONTACT:

REF. 77/09/8

DAVID WADE on:

REF: 77/09/4

Computing Services
Association

Distributed Processing Development £4,000-£7,500 p.a. + mortgage subsidy

The London development centre and 8ristol computer installation of



Schroder Computer Services Limited

The machine works under VM with CMS, to provide distributed processing sectities to group and external clients via 0 veriety of terminals, with on-line program development for the London centra.

The considerable expansion has created opportunities in the customer services and development departments for turther

ere now well established, with the IBM 370/148 computer, one of the first in the UK, fully

Consultants — 1 each London and Bristol The posts embrece the importent roles of client fielson, merkeling support, project auditing and management/systems consultancy. Applicants must be able to demonstrate eignificant success in a similar function.

Systems Analysts — London

A number of opportunities have been created up to Sanfor lavel within the development group on a wide varioty of applications, with amphesia on commercial, investment and stockbroking systems. A proven beckground in programming and analysis is required and ISM involvement degrable.

Analyst / Programmer—Customer Support—London Up to £5,500
The company expansion has created the need for a person to support commercial systems and liaise between clients, setae and technical departments — a varied and interesting job to suit the person who has a sound understanding of overall programming

and systems concepts.

Programmers — London

There is a wide variety of projecte for programmers and we would like to discuss the opportunities with you if you have 1-4, years practical experience which must include IBM A6SEMBLER, with COBOL knowledge useful. These positions represent excellent opportunities with a sound and reputable group, having a high regard for employee welfare, offering generous benefits, including 50p LVs, season ticket loans, flexible mortgage subsidy and excellent non-contributory pension

The opportunities are exceptional and you should telephona our CROYPON Office to discuss them in more detail, please quote ref: CW54-78. 061-236 2419 FAULKNER HOUSE FAULKNER STREET, MANCHESTER, M.1 4YD

19 PARKER STREET, CROYOON, CRE ITN -CAPP ASSOCIATES



SYSTEMS DESIGNER. PLAN y Soule: C4000-C4683 + C620 W pater simplestages cations are trivined for the allow Programmer Romford, Essex

£188 per week

Man Fele Jephreiter of Chong 9
opening systems and PLAN prodramming Required inerpolability for 3
fronthe optived with bosoble ontion is
provided in the control of the Chong 1
Aboy in flow instance, Id. M. Deglieb,
Aboy in flow instanc

QUEEN MANY COLLEGE COMPUTER CENTRE USER DOCUMENTATION setalled and a major part of the double to the

with Computer agreeignes and inches above were checked to write cheekly and conceined. The supposed of computators will be responsible to compute the confidence of the supposed of computers there end how to the first the Confus purequely provides a larger multi-scholes services on well (CL) 19948 2. for Sight by the supposed of the computers that the confusion of the Confus purequely provides a larger multi-scholes service on well (CL) 19948 2. for Sight by the computer that the confusion of th

services developed of the pervices developed of the pervice developed of the pervice of the perv

ANGLIAN COMPUTER SERVICES

SPECIAL ANNOUNCEMENT



With immediate effect Anglian Computer Services becomes:

ANGLIAN D.P. SERVICES LTD.

Due to expansion, we have found it necessary to change our company name and relocate to larger offices.

We have many vacancies for computer staff on our books. We are particularly looking for people with ASSEMBLER and COBOL experience to work in Norfolk or Suffolk.

For further details ring Steve Tumbridge on Danbury 4255 (STD 024)

Our new address and telephone number is:

ANGLIAN D.P. SERVICES LTD. Stratford House, Maldon Road Danbury, Chelmsford CM3 4QW Tel: Danbury 4255 (STD 024 541)

Software Engineering **Analysts and Programmers**

For a new project team exploiting Europe's foremost Communication Equipment. £4,000-£14,000

Based London/Europe

Our Client is a major British and International Force in the field of Electronic Telecommunication. Traditionally market leaders by sales and imposalion they are now a solid property and the field of Electronic Telecommunication that are now and the field of Electronic Teleco putting together a multi-disciplined team to develop and exploit internationally an advanced range of processor controlled exchange equipment. The fearing will work initially between London and Western Europe but safes will be directed throughout the world.

The Software Engineers will be dedicated to the design documentation, simulation and testing of software systems applied to processur controlled the use of structured programming and specialised

programming and system analysis experience related to telephone or similar equipment. At the other under the scale, training is available to cover the specialised aspects of ungineering design for SPC systems and can be given to develop those with lesser experience. Solary is negotiable and will reflect ability, experience and location. Benefits are excellent Applicants, men or women, should apply in strict confidence to P. M. Small, who is mivising the Corriering.

quoting Rel: 547/CW and stalling experience, age.

CB-Linnell Limited

8 Oxford Street, Nottinghom. MANAGEMENT SELECTION CONSULTANTS NOTTINGHAM · LONDON.

Liverpool

Margaret Donaldso an 051-227 4111

Technical **Project Leader**

HAWKER SIDDELEY AVIATION

Throughout the Company, teams of specialists are currently incorporating the effects of edvenced computing techniques in the development of new eircraft design systems for the 1980s. A Project Leader is required to head a team of echnical analysts specialising in all espects of sircraft structures, current priorities being in the fields of weights and geometry, and with additional responsibility for grephics systems.

A minimum of three years' experience in a supervisory capacity, together with a degree in Matha, Computer Science or Engineering, ere

Salary will be commensurate with the seniority of the position, and facilities are all you would expect from e leading organisation. Please writs or telephone for an application form

juoting CW/41 to: The Personnel Officer

HAWKER SIDDELEY AVIATION LIMITED hmond Road, Kingston-upon-Thames, Surrey KT2 508

BRITISH AEROSPACE



PROGRAMMER/

Owen Owen is a rapidly expanding Departmental Storse Group with its H.O. based in Liverpool.

They are seeking to recruit an experienced programmer/ analyst for a madium-sized computer department.

A minimum of 12 months relevent experience is

essential. The herdwere includes a Honeywell 84/20 with disks and tapes, using Cobol Isnguage.

Applications cover the whole range of ectivities of the

An attractive selary will be offered together with a range

Computer Recruitment

SOUTH CHESHIRE

ANALYSTS ... L5000 + Delabon sup.

ANAL/PROGRAMMERO (4000 to 150)

Database of Ferrant Aigus expenses the will be proved on opecualist systems and of

PROORAMMER to £4500, argenese (CORAL ex militar Rinal Time lang, essential

SENTON PROOF (4500 + to control 21 pag-phres assisting managers Constopment posters

ANALYSTS & PRODRAMMERS HITCH OREATER MANCHESTER & CHESHIRL

SALESMAN - to EBHOD + car Self Biogram ages to easing and new customers

ANALYSTS to £500H Bureau environment with expanding long establishment company First-cires prospects includin person ANALYST/PROGRAMMERS to (5000) Cluse

PROGRAMMER to L410th Good programs experience assential —most large consultation INSTALLERS in L30ft) Operator of young programma looking for interesting and varient work essisting Continuers of wall established

ORAQUATES OR HNO BUSINESS STUDIES. Training opportunities in computer work. Chance to learn trade fully and devotog into managinment

QUEENS ROAD MILLS, HALIFAX, WEST YORKSHIRE HX1411
TEL: HALIFAX (0422) 58232 (10 LINES)

Challenging E.D.P. **Opportunities**

ONTARIO - CANADA

Bonaventure Design & Programming Ltd is one of Canada's leading Data Processing Consulting Companies, employing over 100 professionals in Toronto, Montreal and Ottawa, The demand for our services in the rapidly expanding Canadian EDP Industry has created several new openings for

ANALYSTS and PROGRAMMERS

Candidates should have gamed a minimum of four years of experience using COBOL in a commercial environment We demand a high degree of technical competence and profes sionalism from our Technical Stall In return we offer a opportunity to make a real contribution, and to grow within dynamic and stimulating environment where talent and initialing are both recognised and rewarded

In addition we offer competitive satures, a comprehensive benefit package and an fam to Conside for successful applicants and immediate dependents.

Preliminary interviews will be held in London throughout September. Applicants are invited to forward complete résume in strict confidence to :

Dept. 131, Government of Ontario. Selective Placement Services, Ontario House, 13 Charles II Street, London SW1Y 405.

1900 Operator Training Opportunities

£3300-£4600 Windsor

Are you an experienced 1900 Operator? Have you ever considered progressing out of operating to use your wledge and experience in training

We would like to hear from you if

- the ability to communicate clearly at least 2 years' experience as a 1900 Operator
- operator in-depth knowledge of 1900 hardware and Manual Executive knowledge of GEORGE 2 or 3
- a mature and responsible attitude a genuine interest in training fellow

operators. The job involves lecturing to experienced Operators on a range of courses including advanced 1900

operating GEORGE 1/2 operating of activance of GEORGE 3 operating Out established as an authority on 1900 Operating Systems, your career opportunities will include maying on 2900 VME/B and VME/K. You will be based at our raining Centre in Old Windsor, Berkshire Your initial training and the state of the

initial training will include feathing initial training will include feaching techniques, followed by attending techniques, followed by attending techniques, followed by attending the starting salary is negotiable depending on previous experience.

Please contact Mary April of the starting salary is negotiable.

Assistant Personnel Officer (C.)

Assistant Personnel Officer (C.)

Beaumont, Old Windsor Balahir SL4 2IP. Telephone Windsor Balai. Please quote reference CW1506.

International Computers

think computers-think ICL

Software house seeks owners SPECIALISTS TO C. £6000 - £8000

Our success

- Holland Automation is an international company formed in 1974 and the Group turnover for the first half of 1977 exceeded £350,000 in Holland and the U.K. from pure systems and programming activities.
- the Group's success and its high reputation has been gained from the production of high quality software in the commercial and development software areas of both clients and the major European computer manufacturers and micro-processor

- software specialists to work within application groups on small business interactive systems.
- specialists to work on micro-processor projects for new hardware
- responsible personnel capable of working without detailed

- minimum of four years' proven programming experience in assembler languages.
 BASIC or PL-1 an small business systems, mini-computers or micro-processors.
- to be self-motivated and have worked on computers in a commercial environment
- to have worked on micro-processors, software development for a manufacturer, or data transmission experience would be an advantage.

Applications, including c.v. in writing to:

Holland Automation International (UK) Limited 457a & 459 Bath Road

Cippenham, SLOUGH SLI 6AA, Berks.

or telephone for Application Form-Burnham (082 86) 65232/3.

provision of a strong bond between employees and the Company. Holland

Automation International

all employees are shareholders.

- all shareholders are employees.

- work on variety of projects on latest up to date interactive systems and micro-procassors.
- good working environment with enthusiastic motivated personnal aiming to produce good quality software.
- good competitive salary up to £6,500 dependent upan
- experience plus bonus participation based upan performance. - full shareholding option and participation in campany profits.
- car or car allowance.
- pension and life assurance and medical benefits.

- only method of operating a successful software house is with enthusiastic highly

motivated staff who are given reaponsibility and a high degree of involvement in the

- four weeks' annual holiday,

- offer working on large scale projects as part of a big team with little feeling of
- guarantee an unemotional feeling towards the Company.
- want staff who consider themselves more important than the Campany or the
- need consultants by name and not by proven deed.
- require staff who cannot work without detailed supervision or lack basic

datascene

FORTRAN PROGRAMMERS LONDON & HOME COUNTIES £3000-£5000

We have outstending opportunities for Fortran Programmers, with a background in any of the following:

OPERATIONS RESEARCH FINANCIAL APPLICATIONS

01-439 7871

Our cliants include well-known Softwere houses, manu-lacturers and international angineering organisations.

FOR FURTHER OFTAILS CONTACT US NOW Datascene Limited

Sceptre House 169-173 Regent Street, London W1R 7FB

datascene

JUNIOR OPERATORS 6-15 months experience ? WE NEVER WANT TO SEE YOU AGAIN!

scene can get you that batter job. And we like to think that once we've tount

It for you, you'll stey. Se we iton't look terward to seeing you again — tor a long, leng line.

We've get vacancies on IBM, ICL, HONEYWELL and UNIVAC plus a few an

way to the standard of the sta

FOR FURTHER DETAILS CONTACT US NOW.

01-439 7871 169-173 Regent Street, London W1R 7FB

ALL OPERATORS

datascene

ANALYSTS 'PROGRAMMERS CENTRAL LONDON £4000-£5000

Plus Staff Mortgage !

if you have proven on line exposience on tBM/ICL with COBOL or PL i. our client needs you now!

They are a financial institution who are currently developing a real-time system using the latest generation of intelligent terminals. Ao, for big company banafite, unlimited carear prospects and a mortgage that is nearly painless, ring TODAY.

FOR FURTHER DETAILS CONTACT US NOW

Datescene Limited

01-439 7871

24-horn sasworing service Sceptre House 169-173 Regent Street, London W1R 7FB

datascene datascene

MINI SPECIALISTS £3000-£7750 CENTRAL LONDON

I you are a Mini Programmer and have been involved with technical ar-commercial applications and have experience in any of the following, we want to

AIN ABSEMBLER MACRO II SASIC + RSTO NOVA/ASSEMSLER

You'll be working for a Europeon Software house in a position to oller extensive

FOR FURTHER DETAILS CONTACT US NOW.

Dalascene Limited Sceptre House 169-173 Regent Street, London W1R 7FB

01-439 7871

FOR FURTHER DETAILS CONTACT US NOW

01-439 7871-Datascene Limited Sceptre House 169-173 Regent Street, London W1R 7FB

EUSEX
WIT
SURREY
BUCKS
MIDDX
CITY
N. LONDON
W. LONDON

18 Mths 16 Mths 18 Mths 18 Mths 18 Mths 12 Mths 12 Mths 12 Mths

datascene

SMALL BUSINESS MACHINES RPG 11 PEOPLE

leest two years' experience of RPQ*II.
Insistetions include IBM System 3, 370 and Model 32:3CL/2503, Honey,
Burroughs and mutty, many more
Representation of the system of

Clientrare just as verted, including Banks, insurfaces, Refall and Consultancies.

Listed below are just some of our vecencies. If you find one that and a you's or aven if you don't -- we want to heat from you NDW!

APPG II Service Suresu. SYS3/10 W/: 0.24000

APPG II Insurance Co. SYS3/15 NEW 24200

APPG II Bank SYS3/15 City 24400-25200

APPG II Manufacturers 1CL 2503 Middle, £3500-25000

APPG II Financial 1CL 2503 Surrey d 25000 6, 24000 24200 24400-25200 23800-23800 6, 23800

Datascené Limited

01-439 787

Sceptre House 169 173 Regent Street, London W1R 7FB

ANALYSTS/PROJECT LEADERS £5.000-£6.500

TRAINEE ANALYST/ PROGRAMMERS circa £4.000

H. WYCOMSE & UXSRIDGE & HAYES

PROGRAMMERS/DESIGNERS To £5.500

SYSTEMS ANALYSTS

£4,500-£5,750

tost two years' Systems expensince is required to work an project from fullity study to implementation. Senior positions involve some project of Graduatina preferred.

SYSTEMS PROGRAMMERS

W. SURREY
R/P System Programmers ideally with resembler experience on mincomputers are required. Preference will be given to graduates or equivalent
in Computer Science. Maths or Engineering.

AMPEX

COMPUTER PERIPHERAL SUPPORT ENGINEERS

We need more good field and In-house angineeral

Our sales and support requirements are increasing rapidly and we are looking for people well qualified and versad in computer peripherate with special reference to core memory and memory systems, disc drives end teps drives.

There are both senior and junior positions available and we will be pleased to hear from you if you think you can make the

Applicants should have a good background knowledge electronics with ability to service down to component level, at least two years of practical experience and the ability to absorb continuing training in the letest techniques. These positions provide excellent career opportunities, salary and company car

Plasse apply to Personnet Menager, Ampex Great Aritain Limited, Acre Road, Reading, Berks. Telephone Reeding 05200.



Systems Analysts 5 upto£4,300p.a.

The Management Services Department of TI Tube Division Services provides an internal consulting service to the 20 operating companies of the Steel Tube Division which hava a combined turnovar exceeding £300m. and manufecture and market a wida ranga

Dua to promotions within tha Dapartment, we are now able to offer ettractive posts to analysts. These appointments provide tha ideal opportunity to gain wide axpariance of systams - using mein framas and minis and employing the latest techniques in date base and data communications - for manufacturing, commercial end other functions.

Idasily candidates should be primarily interasted in epplication rather than computer tachnology and ba sufficiently self motivated and exparienced to enable them to work on their own initiative in operating company situations.

Most projects are at companies in the Wast Midlands and those further afield may occasionally involva an overnight stey.

Applicants should have a working knowladge of industrial information and control systams using computer or D & M techniquas gained from 2-3 years practical

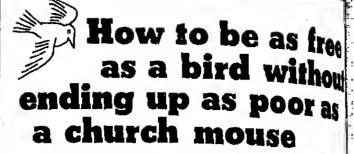
The positions are open to man and woman and offer axcellent carear davelopment prospects in Management Services or in Lina Management, Terms of employment ara good and include travel and milaage ellowance.

Plaase spply in writing giving full parsonal details of experience to date to:

Mr. L.E. Faareneida, Personnel Manager, Ti Tuba Olvision Sarviess Limited. TI House, Five Ways, Birminghern B16 950

Steel Tube Division





Just answer the following questions:

 Established freefancar? Able to work in London?

Experienced in COBOL or ASSEMBLEN

 Want to earn good monay? Want to work for a people-orientated

company that offers a good return for If the unswer is yes to all of these then contact Square One for a square deal, Ring ANNE TRUELOVE at Chestiam (02405) 74161



Square One Computer Services Like 9a Market Square, Chesham, Bucks HP5 1HG

OROTARGEAL PRITUPMO Applications are invited from gradiantus with good honours degines for the

(3)

0

0

0

0

0

COMPUTING OFFICER (INFORMATION) Ref. CL/41/CW

The information services provided to computer users include a wide range of documentation, an information and solitions. The successful candidate will be Aspected to crease new man-ares in addition to undering

COMPUTING OFFICER (SYSTEMS) Bef. CL/42/CW

The successful candidate will work un a linked PRIME 300 system and should have some expenence of nitri computers and be interested in computers in a contraction protocols and network its valuement Experience of assembly larguage programming is essential unit know ledge of rad time working and Frittan would be described.

Setary on the ecolo C 1333 - 1 6627 per consum. USS/FSSU

Application forms and further parties less may be obtained function that flags for a University of Salitard School MT 4W1, to whost completed forms stample for antich for antiched by 1911 September, 1977, quoting the appropriate reference.

TECHNICARE

A rapidly expanding U.K. company engageti Maintenance and technical training price, worldwide require personnel with the follows? qualifications and experience on our permane

2. Operation Support Technician on above equipment. Minimum 2

B. Service Engineer/Technician with fet experience on Hewlott/Packard computer Systems Analyst with software/hardware

Genotous salarios are offered, with accommetion, food and loave travel free of charge.

> Mrs. A. Noirn Rose Industrial Estata Bourno End, Bucka. Or Tefophono Bourne End 22823

INTERNATIONAL

staff overseas:

A. IBM 37D/158

1. Programmer with minimum 2 years' experience in OS/VS1

years' experience.

and PM knowledge.

Suitable applications to:

Technicoro Internetional Lid.

Secough Transurs's Constiment

The Council operation of 1901A with tapes and feet

Accrington, Land. to whom they should be returned not later the September, 1977,

Borough of

Remember when big software companies were still small enough for you to matter?

It's not hard to see why the software industry is so attractive to staff. There is the wide range of applications and computers. The high professional standards. Stimulating colleagues whose experience covers many technical disciplines. Above all, the satisfaction of being in an environment where the Individual counts. Where career opportunities and progression are carefully matched to personal ability and where each man and woman sees the direct results of their efforts.

Unfortunately, growth can bring problems to even the best software company. At 300 professionals (give or take a few) the second tier of management arrives. The people at the top are that much further removed from both employees and clients. And for the really ambitious reaching the top has become harder. Later, at a strength of 400 to 500, many staff begin to feel that they might as well be in a company of 10,000.

Data Logic has 180 professional staff. We are big enough and financially secure enough to be credible for projects as large as any that our competitors can take on. We are still small enough to know whether a man in the lift Is an employee or a visitor. Per capita we are probably the most profitable software company in the country. That demonstrates the quality of our project teams and management, it also matters directly to our staff, all of whom share significantly in the profits which they create.

We are growing steadily. Not uncontrollably fast, yet at a rate glving all of us at Data Logic the opportunities we want. We plan to grow even more as the vacancles below show. But we are still some way from that 400 mark. And when we get there we happen to believe we'll handle it rather well.

Come and meet us to judge for yourself. We think you'll agree.

More than just a living, more a way of life.

Too often in this hurly-burly world, life is divided into two separate areas-your job and your recreation-with no link between them. At NCR we combine the best of both

At our unique location on the coast close to all the premier Scottish golf courses, with motorway links to Edinburgh and Glasgow, and with the ski slopes on the horizon we can offer a quality of life second to none. And we offer stimulation at work-our innovations in computer technology are rapidly being acknowledged in the data processing world.

To maintain our pace of development we need new computer specialists, qualified to degree standard, in:

Software Design

The people we require will hove some experience in assembly level programming and in one or more of the following areas:-

- Programmatic control of electromaclinical devices

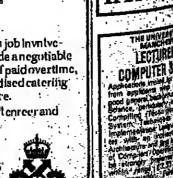
- Diagnostie programming - Mini/microcomputer operating systems

– 1/I) drivers

- Transaction programming languages
The rewards with NCR, in addition to high job involvement and excellent social amenities, include a negotiable salary, 35 hour week, with the possibility of paid overtime pension and lile ossurance achemes, subsidised catering facilities and generous relocation assistance.

In the first instance, please write giving fuftenrees and personal details to:-

Ian Hume, Personnel & Employee Relations, NCR Manufacturing Division, Kingeway West, DUNDEE DD2 3XX.



Project Managers

For msinframa, minicomputer and nixed processor eysteme, usually supporting terminal networke.
Increasingly, Oate Logic's turnkay projecte involve muftiple, separated

Applicants must have at isset 5 ears implementation experience. They must have maneged a elzeable project or have teken substantiaf team responsibility.

Database Consultants

To edvise cliente on the creation or upgrade of delabesee and to essiat Data Logic taeme in the deelgn of retrievat systams. Projecte will involve both meinframe end etandelone minicomputer

Applicants ahould have exparience in the design of record structures end heve used et least one of the leading database packages such as ADABAS, IMS, IOTAL and DMS/2. Knowtedge of banking or tneursnce is ot particular interest.

Senior 2900 **COBOL** and System Designer PL/1 Analysts

For consultancy and implementation projects, with a biss towards large ICL 2900 models. Applicationa will include detabase aystama and communicationa natworka. Extensive knowladge la required of hardwars capability, operating ayatama and standard software, The scope for application of this knowledge and for career progression will be considerable

a variety of interesting and demanding applications, including banking, insurance, manufacturing and distribution.

Applicanta ahould have 3-5 yaara ansivela and programming axperianca. A sound knowledge of

Minicomputer System Designer For work at the forefront of tha For mainframa projects involving

commercial application of small computara. Tha majority of projects will involve data communications and eavaral eystams now in thair aarly stages include many tarconnacted procaesors.

Applicants should have at least 3 including system sizing and

sciances and one or more years practical experience in assembler or FORTRAN. Date Logic offere four weeks annual leave, free insur-ence end a contributory pension schems. Salaries are excellent end in addition ell etell ehere in company profits. We pay particular care to career development with the eim that responsibility end technical skills pro-grees as last as individual ospability permits. Digital Engineer

Scientific/

Mathematical

Programmers

Principelly for resi time minicomputar systems applied to

ansiysie and/or control in solenlific

environmente, There may afeo ba

aoma problam aciving in high level

language on mainfremes. Applicante ahould have a refevant

dègrea in tha methematical

Programmers For design and davelopment of systeme incorporating cuetom-built davices such as interfaces and terminals, with an emphasie on the

usa of microprocassors.

Applicante should have a degree in alegtronice or computer eclanda and have programmed mini or microcomputere at assembler or microcode level.

W. D. Barrow Oata Logic Limited Weatway House 320 Rulalip Road East Greenlord Middleaex UB6 9BH

Tel: 01-578 91.11

For meintreme eseignments we are seeking knowledge of IBM 370, ICL 2900 and 1900 series, Burroughs 86700 and Honeywell H6000.

For minicomputer projects, knowledge of Date General or DEC mechines is preferred, although a background with any other leading make of small computer le of

A. W. Tsylor Data Logic Limited Folay Estate Heraford Tel: 0432-55211

Data Logic Limited Warwickgate House Warwick Road Stretford Manghester Tel: 061-872 3232

PROGRAMMERS

After TWO YEARS COBOL experience, are you worth £4,500 in a growth installation?

If so, use the coupon to tell us.

PERRONAL OFTAILS	REF DT/34
Name	
Address	
- '	
Home tel no	. Ago
Office tel na twill be used	
EOUCATIONAL OUAUI	
DATA PROCESSINO EX	PERIENCE .
Yoars programming	. Years systems analysis
Languages used	
Machines worked on	
Presson salary	Salary required
Jaks sought	Spary resoured
-	· -
Send to David Tervell, No 85/87 Jennyn Skeel Londo	Norrosi Management Sorvices Ltd.



P.O. Box 63, Copthall Tower House, Harrogets, HG1 1TS. 85/87 Jermyn Street, London, SWtY 6JD. Tel: 0t-930 8851.

One of Britein's most progressive groups with meny years of uninterrupted profit growth requira for their expanding wholly owned subsidlery

PRIESTMAN SYSTEMS ANALYSTS

For a New Burroughs Installation Operating through V.D.U's in a Manufacturing Environment end using P.C.S. and Order Processing Software.

Priestman is one of Britain's leading menufacturers of quality construction equipment.

The successful applicants for these demending posts will heve e dynamic personelity, the ability to leed end e proven record in the industry. Experience of B1700 and/or DMSII is desirable.

Reply in strictsst confidence to the Dsta Processing Managar.

PRIESTMAN BROTHERS LIMITED HEDON ROAD HULL NORTH HUMBERSIDE

Software Programme

Sussex

A forwerd looking and prolitable manufacturing company with a growing commitment processing now has need of a person to fulfil the Systems Programmer rule

The prime functions are to achieve optimum performance of the operating system and as The prime functions and to active opening to assist princate and princinco standards and assist princinco standards and assi tachnical support intarnally.

The requirement provides the opportunity to work within a small, framily departmenting rural erae but with a wido choice of housing, easily accessible to the South Coest Generous essistance is available where nonessury.

It is preferred that applicants have a should background of ASSI MBIER programming in the control of the contro anvironment, ideally IBM DOS and/ur DOS/VS but proportioners with a minimum of 2 will wenting to enter the technical programme will be considered by the following

Plaesa talaphona our CROYDON offico for further urbrenation. Please quoto rof: CW55.78

01-666 9693 (24 HOUR ANSAPHONE) 19 PARK STREET, CROYOON, CR91TN

061-236 2419 FAULKNER HOUSE

CAPP ASSOCIATES LONDON AND MANCHESTER

Cobol **Programmer**

This is an opportunity to join a young toans with exciting growth potential. Having recently edvertised for air nnalyst aird

e programmer, we tind that our increased devalopment piens necessiteta the addition of another programmar to our team.

We are ambarking on a major development phase to supply computing lecilities to nowly acquired compenias in our group. Aleos cuvurud will ranga from order/invoicing, stock cuntrol. alc., to rether more esoteric applications such as e structurel strass enelysis and front loss

Our equipment comprises one of the larger I.B.M. System 3/15D installations in the country, with a strong commitment to davaloping our 3270 T.P. network. We ruguing a programmar with at least 1B months' experiance, who has the ability and the ambition to widen his/her knowledge of communing mrd businass in many divarsa props.

If you think you can ploy an inspiritant kind contributory role in our dovelopment plans untiwant to be involved in a mnior devulopment if its nesption, writa giving full dotnils lu:--Personnal Monngui

> KYLE STEWART

Ardshiel House, Empire Wuy Wombioy, Middix, HAII ONA

or talephona: P. Campboll 01-902 5321 uxt. 230

UNIVERSITY OF OXFORD

Appointment of a Computer Programmer

The computer is an ICL 1901T. Applicants should have at local two years' experience of PLAN and/or C060L, platerably on an ICL 1900 series mechine. A knowledge of FTL6 would be an odded odvontage.

islery will be on the scalo or present £2904-£5.627 starting celety scoulding to qualifications and experience.

Further particulors may be obtained from the Copuly Registrar (Administration). University Offices, Wollington Square, Oxford OX1 2JO, to whom opplications should be sent by 19th September. 1977

SENIOR COMPUTER OPERATOR

Is sought to wark tot one year within a small form of the Coffage Computer Centre at Futham Bloodway. The person appointed will have of least two years: sporaring experience on main-trame computers. Dieval Mathematics and English. Together with mininum quelifities tions of linked to a POP11/A0 "tront ond" computer is an ICL 4130' relecommunications. Batch and time-shared interactive computities the declinite ligit up to the terminals are horided concurrently. In addition, is salest with terminal trike to the University of London COC machines. Allowence and Supplements). A shift allowence and Supplements). A shift allowence of £4.50 London also paid for two-shift operation.

Applications, giving full details, to Mr. R. F. Shephold, Compuler Control, Control of Condon: Pullbr Place, S.W. B. Tell. 01, 36 1244

STRATHCLYD

COMPUTER SERVICES DEPARTM

SYSTEMS ANALYSIS Snlory Scalo: A.P.III £3474-£3825 + popular

nf £312 and 5% of salary. A.P.IV £3957-£4395 + supplies. of £312 and £208.

Placing according to qualifications and states Local oil May House, Anderston Creek

controbute or the design of systems wherevolved and where portronton a characteristics are more The authority is disvoluting union systems of ag-tions, which will be opened on a teleprocess; because on provential HeliCitesines compute a local

the Lampatha Sorvice Department provides the n character for minute individual to the many vanel (\$2 within the millionity and there is much stope but and theselogonal applications employing is: computar techniquas Applicants stoodd have provious relevant sign

FORTRAN PROGRAMME

Sninry Scale: A.P.111 £3474-£3828 + aug/less of £312 + 8 % of annual select A.P. IV £38 £7-£4385 plus registr of £312 and £208.

Uncluy according to qualifications and expert

the multimity or on actions to terminal collection A large variety of prevental packages are support rear of Jordan of mult other deportments. The anything of the property of the

This is a mind train intending to a very significant. This is a war significant thing in a very significant in

Application forme for all the above port obtained from the Assistant Director of Services, 21 Gordon Street, Clasger 81 March 1977.

R. M. O. McCULLOCA

ANALYST

A loading publisher of Scientific docume London requiras an ANALYST.

Tha work comprises instructing and Computer bureaux in U.K. and U.S. customare on questions raiding to out. and our international on-Lina (atternational The successful applicant will have at least a systems experience and some programming preferably on i.B.M. 360/370 system some on-line experience. Preferred as

The position cardise a salary of up to 16.00 to experiance. Holidays and benefit associated with a progressival expending to

Ploaso writa with abridged curriculus ville Person net Menaget Derwent Publications in Rochdale House, 1 28 (neous) London WC I X 8 (1)

SENIOR ANALYST PROGRAMMERS

SOUTHERN ENGLAND CLOSE TO SOUTH COAST

SALARY up to £6500 pa **PLUS BONUSES**

Do you have a thorough knowledge of RPG 11 and an interest in working on multi-location systems, involving occasional overseas travel?

II so, our client would like to mset you.

As en international organisation, with worldwide merketing interests, they have established computer systems in numerous locations, including Jepen, Csnads,

All systems development, besed on either IBM System 3 or IBM System 32 herdwere, is devaloped/controlled by a cantral team at their UK Date Centra.

Their prime requirement is for two Sanior Analyst/Programmers for the manufecturing systems group.

If you have sound manufecturing /commercial systems end programming axparianca, have seen at least one major system through to implamentation and really anjoy complete involvement in ell aspects of aystems devalopment, then you would find these positions particularly attractive.

If you can show our cliant that you have these qualities, then you could be asming a total package worth up to £7000 pa in tha very near future. In eddition to salery there are discounts on company products and generous

Please epply to John Goldsmith, quoting Ref. No. 691

John Goldsmith (Computer Bervices) Limited 15 Suckingham Petece Roed, London SW1 Tel: 01-828 5355, 24-hour answering service

JOHN GOLDSMITH (Computer Services) Ltd.



2 AREA SALES SUPPORT EXECUTIVES NATIONAL BUREAU **SALARY RANGE £4,000-£5,000**

+ CAR + BONUS

Due to continuing expansion, our Clients, o well established and specialised Computer Bureau, seek two Professions is to augment their existing marketing team. Responsibilities will include: detailed pre-sales work combined with on-going post-sales responsibilities, including: training, implementation and customer liaison. These posts are seen as developing opportunities for senior sales and marketing positions.

Successful candidates should have experience of date processing in o user environment combined with an understanding of modern business needs. Candidates should be confident and wali presented, and capable levels. One of the successful candidates will be based in the Manchester area, the other in Southern England; however, travel to user sites within each

An excellent salary will be peld, based upon previous experience, and the job also carries a Company car plus on excellent incentive scheme and fringe

CONTACT:

DAVID WADE on: 061-833 0676. or the London Office on: 01-935 067i

REF: 77/09/1

LONDON TRAINING MANAGER INCOME TO £9.500 +CAR+BENEFITS

Our Client is one of the most successful Computer Services Opcretions in the World, which sells and supports sophisticated solutions to business and manogement problems. The Compeny's natwork spans Europe end the USA, with products and systems which ore omongst the industry's finest. The Company is noted for it's sound attitudes to training and it's recognition of the importance of the internal training function. This kay appointment orises out of the promotion to a Sanior Sales Manogament leval of the present incumbent. It calls for the active participation in the seies and management training of the Company, and the supervision of technical

Interested candidates abould have:

* probably a sound salea and salas managament background within the computer services or business machine industry - this period should have been spent with an organisation which has recognised professional sales training: for axample: NCR, Burrougha, Olivatti, Philipa, etc.

* the ability, not only to deliver our Client's packaged sales and management training

but also to davelop future material:

* a desire to devalop a career within a fast-moving Internetional Company

* agad 30/40

CONTACT: PETER RIGBY on;

SPECIALIST COMPUTER RECRUITMENT LTD. BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Oueensway, Birmingham B32BR

MANCHESTER 061-833 0676 FREEPOST Freepost 6, 102 Blandford Street, London WiE 1JZ

MANCHESTER

DATA PROCESSING MANAGER SALARY NEGOTIABLE

We are ratained to recruit a dota processing professional for our clients, a public Company specialising in high technology products to the transport industry. The successful candiate will take complete control of a small data processing department utilising Burroughs B700 hardware. Dutles will include systems development, programming, tuning and control of operationa/deta

* a proven track record in systems/programm-

* Burrougha experienca (preferred) * en understanding of smell machina operations

* good man managament akilla

* the ebility to communicate fluently and liefae

Our clients offar excellent benefits including: an eboya: averags: penalon achema and relocation expenses by negotiation.

CONTACT: David Wede: 061-833 0676. REF. 77/09/3







We are currently seeking the following staff for ORH Softwere Ltd.. a member of the ORH Computer Group. The growth retered the tast 6 months has been approx. 100% and to continue

WEST YORKSHIRE
Project teeder to £8700 Pref. with manufacturing systems and commercial expenses. Must be able to successfully develop and control dwn leam.
Progremmers (2) to £4500 COSOL or RPO If knowledge,
general commercial applications
Planned progression to systems work.

Programmer to £5000. C080L or Assembler with general systems knowledge. We'll known company Good opportunity tor hard worker.

Graduate or HNO to join team to train se programmer. Planned career path in Computer World.

Programmer to £3800 t8M and COBOL experience preferred.
Large programmer group with additional equipment being installed this year. Analys1/Programmers to £4500 COBOL PLAN or PL1 experience. General commercial experience, interesting work with opponunity to learn.

BRADFORD Programmer to C3900, COBOL or PLAN experience. Smell teem set-up in well-known company We elso have many other vacancies in the North.

> QUEENS ROAD MILLS, HALIFAX **WEST YORKS HX1 4LR** HALIFAX (0422) 58231 (10 lines)

SYSTEMS ANALYSTS

PROGRAMMERS

BORDERS REGIONAL

COMPUTER MANAGER

PO II £5895 to £8498 + £520 eupplemente

icatrons ara invited the above post from computer professionals with a minimum i tive years' experience.

Tha Council with shortly upgrada its existing IBM 370/115 installation to a 128K capacity. There will be three disk drives and one tape drive, the system running under DOS/VS.

Applicants must be able to imonstrate a proven racord of successful records systems plamentation and have the pility to control a multi-disc plins teem of enalysts, programmers and operations staff.

Application torms and turther paniculars may be obtained trom the Head of Personnal and Managament Services. Regional Hasdquerters, Nawton St., Soswella TO6 OSA, with whom applications should be lodged not tater than 9 September, 1977.

scientific epplications whilst employed by a cumputer service burnium. The pressure of such an active environment demands the namest Iron a dynamic highly-computent operator, capable of making decisione, recognising problem arens, and working with n minimum of supervision. Someone who will react further than just loading tapes or changing pages.

You should have a minimum of six months, operating extroment a publicably in an IBM OS environment A progressive cereer to date is important, but enthusiasm and distormination to surrecof will add weight to

If you feel confident enough to enter the elite, in a powerful 37D installation, then the rewards are high and future prospects excellent. This is a rare and important opportunity to toin a close-knit team, within a

30 Fleet Street London EC4Y IAA

MAINFRAME AND MINIS

CMES is a successful (Software) house established in 1970. WE are looking forgood programmers who will be based at our St Paul's office or at our clients in London. Home Counties, MIDLANDS & SOUTH COAST so that we can continue our expansion. We would prefer you to have a minimum of 2 years' experience on more than one machine with at least two languages.

Remuneration will be attractive and negotiated in accordance with your experience and ability. Our urgent requirements are: -

370 370 1900

DOS or OS DOS G111

PL1 or BAL

Use our FREEPOST service if you wish or leave a message

Systems Test Engineers

TELEPROCESSING IN NORWICH

Our cliant is making major upgrades to their IBM 370 (working under DOS/VS) to undertake additional teleprocessing developments which give exceptional opportunities tor project team statt at all levels to combine interesting career prospects and attractive working conditions with the "good life" of Norwich — (excellent aducational, shopping and cultural amenities, osay access to the unique recreational tacilities of the Norfolk Broads, countryside and coast time, plus a wide cheice of relatively inexpensive housing).

Must possess the ability to communicate attactively with all tavals of management; and have praviously implemented at least one major system in a financial environment. Experience of TP systems an added adventage.

Should have at teast two years Assemblar background and whilst experience in CICs/VS and OL/1 would be adventegeous, training will be evailable

In addition to competitive selerise, the excellent company benetits include tree lunches. Ilexible working hours, and assistance with relocation expenses where appropriets

For immediate action, in complate confidence, ring Bryan Richmond on Norwich (0603) 867233 env dev up to 9.00 p.m., or write with brief details of experience end selery to:

EAST ANGLIAN BYSTEMS LIMITED

AMDAHL is a leading manutecturer of ferge acsie, high-speed computers. We are establishing our first manufacturing bese outside the U.S. In the Oublin area to further our expension, in our first full year of operation, 1976, our sales revenue was U.B. \$93,009,900.

Amdahl needs an Exceptional Team

As Amdahl's repid growth continues, we need professional people with experience to fill the following positions.

Systems Test Engineers

Candidates for this position should have 3-5 years experience in hardwere finel test, fogtc deelgn, or flefd support of madlum or isrge scale digifal computer systems. IBM 360/379 or competible systems is praterred. HNC/HNO, Degree or equivalent technical treining is required.

Lead Systems Test Engineers

Candidates for this position should have 7-19 years experience in hardware finel teat, logic deelgn, or field support of medium or large scale digital computer systems. IBM 360/370 or competible systems is preferred. HNC/HND, Degree or equivalent technical training is required.

Systems Test Supervisor

Cendidates for this position should have 6 or more years in the computer industry with at least 3 years of technical management experience. Their field of expertise should be hardwere final test, fogic design, or Itield support of madium or large scale digital computers, prelarably IBM 360/370 or compatible systems. A dagree is highly desirable.

Although the paef year hea seen us grow, fhere's atill room on the ground floor for tridividuals who eack a chalfenging, friendly, start-up environment. Our benefits package is excellent end you'll be well compensed for your efforts. Suttisbly qualified men and women should forward completed

> Gaorge Zukerman, Amdahi (UK) Limited, Viking House, Lampton Road, Hounslow, Middlesex TW3 1JO, Tel; 91-572 4312



OPERATIONS Computer Personnel Consultants

IBM OPERATORS

B months-3 years OPERATING LONDON

There is no better way to gein very valuable operating experience: then training a variety of commercial and

your epplication. You should also lest roady to accept responsibility

sophisticated computer organisation

Please telephone for a confidential discussion or write:

PROGRAMMERS

COBOL COBOL

PDP11 RSX or RSTS BASIC + or MACRO 11

Telephone or write to:

Bob Osborn

21/25 Gold Road, W12 8QQ. 01-743 1114

during the evening on our Ansaphone.

FONTAIN

13 11 11

PALAIS

ALAN LOCKERBY

ITT COMPONENTS GROUP EURON

EDINBURGH WAY

ANGLETERRE

PARIS-View of the Champs Elysées at night

Dear Alan, Met a girl from 17T Harlow last night -sitting at same table in a cafe along the Champs Elysees. WE II MARIN Couldn't believe it when she said she was a programmer too! Told me you need more COMPUTER PROGRAMMERS for UK Head Office to work on new systems for Honeywell 66/20-on real-time basis. Is it true that the salary would be around £5000? I have nearly 2 years COBOL experience

and am Looking for new job in large expanding company such as ITT Components Group Europe -very impressed with company's track-record throughout UK and Europe... nould like to see you when I return to discuss opportunities. Will phone you on Harlow (0279) 26811 or write again. Chris
P.S. The lady sends her regards! Components

HARLOW,

ESSEX

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants

SENIOR PROGRAMMING STAFF

Large tBM Installetion

A major manufacturing and distribution Company to the west of London is seeking senior programming staff to supplement an existing programming teem. The Company has recently upgraded their hardware and is currently developing several new systems using the letest IBM

A Chief Progremmer is required to manage the progremming team. A proven track record; capable of scheduling work, meeting deadlines and ability to communicate with senior management is essential.

A Systems Programmer or experienced Assembler Programmer is required to eventually take fult responsibility for systems softwere.

Salary for these positions will present no problems for the successful applicants and the banafits package is commensurate with that expected from a large international Company.

COBOL PROGRAMMERS

New Dapartment

CLONDON

£3800-£6500

Excellent opportunities have arisen for Programmers seeking a position within a new team in a

The company, part of en internetional group, is a leader in its field. Successful applicants will be engaged on extensive development work on an on-line commercial project. Training will be given and those appointed will be encouraged to accept increasing responsibility and gain progression towards design and analysis in the future. Candidates should be able to offer 1-4 years COBOL experience, as appointments will be made

on a level appropriate to individual experience The company has a range of fringe benefits including lour weeks annual holiday and flextime.

SENIOR ANALYST/PROGRAMMER

3 years' experience

LONDON

c £5500

This position offers positive cereer prospects to e progremmer or enelyst/progremmer seeking a greater chellenge, more advenced technical experience and additional responsibility.

Heving auccessfully computerised a number of accounting and management information aystems, the Company is now developing a large on-line system to assist with the production and distribution of a wide range of its products. Working within a small apacialist task the successful candidate will have the opportunity to broaden his/her experience on this unusual application using the letest techniques and equipment.

Applicants should have eround three years' programming experience and be keen to participate in analysis activities involving considerably user contact.

This is a senior position within an expending organisation where conditions of employment ere excellent and accompanied by a range of fringe benefits.

PROGRAMMER

S. E. LONDON

to £5,600

This is an interesting and chellenging opportunity for an experienced programmer to join an active department with an enthusiastic approach to computing.

There will be en initial period, during which the person sppointed will acqueint thamselves with the instellation and the company business. After this period they will be encouraged to work on their own initiative often unsupervised. They will become involved in all aspects of systems development end wilf be largely responsible for the smooth running of current live

Candidetes will be able to offer programming experience, preferably using COBOL, coupled with some exposure to basic systems enelysis.

> Please telephone for a confidential discussion or write to: 30 Fleet Street London EC4Y IAA 01-353 5868

PRODUCTION DIVISION

Our Production Oivision has the largest commercial DEC 10 time sharing installation in Europe. We operate 8 OEC System 10's In the U.K. each with 256K memory, 200 Mbyte disks, msgtapes, cerd readers, lins printers and paper tape equipment. We support a comprehensive nel-work throughout the U.K.and Europe and have a Transetlantic link to 12 DEC System 10's in the U.S.A. We are looking for the following technical staff and can ofter you the opportunity to expend your knowledge and work in a sophiaticated and rapidly developing environment.

COMPUTER AND PERIPHERAL ENGINEERS up to £5.5K + car allowance

To be trained on and assist in the daily development of the systems backed up by jumpr and senior engineering statt. We are tooking for experience on a wide range of peripherals plus a good background in thip tevel repair of momories and processors Contact by phone or letter CHRIS TURNER. Ext. 274 or 249.

SERVICE ENGINEERS ELECTRO/MECHANICAL up to £3.8K

Required to work in Greater and Central London areas. A sound knowledge of electro-mechanical devices is essential and a good electronic background would be an edvantage, it you have worked on Teletype 33/35's, needls matrix printers, telex equipment or thermat printers we will be eager to see you Contact by phone or letter PAUL SARFIELO. Ext. 252.

OPERATIONS STAFF up to £4.5K

We require all grades of Operators to work on our sophisticated systems. The total configuration is available 24-hours/day.7 days/week and operates on a 2 shift system: It you have experience of supervising staff and are dynamic and intelligent than give us a ring for an informal discussion. Contact by phone or letter BOB CHRISTIANSEN, Ext. 250.

CUSTOMER SERVICE OFFICERS up to £3.5K

We are looking for intelligent young people with a confident telephone manner who will respond to this important function to the Company. The job entalls responsibility for the I/O control of all Media. We work a 2 shill system 0800-1800 and 1200-2000. We would expect you to have a good knowledge of the confidence of knowledge of operations/data control and a desire to operate psripheral equipmentequipment/greph plotters, etc. Contact by phone or letter KEITH ANDREWS, Ext. 201.

> Orring MAGGIE LEWIS. Ext. 249 who will take your name and telephone number and pass It on to the appropriate Manager.

EDD SYSTEMS AND PROGRAMMING DEPT.

Our Systems and Programming Department provides a professional implementation service to our Clients in the U.K. and EUROPE. We provide teilor mede systems using a combination of programming packages and standard lenguages applied to business oriented applications.

We are looking for staff in LONCON, BIRMINGHAM and MANCHESTER and if you have a good

Systems and Programming record with a COSOL and/or FORTRAN background then we will provide you with a wide variety of projects + on-line program development + close lieison with end users and the opportunity to work in a Company which is part of the lergest bureau operation in the World. We are currently pisnning to double the size of the department end are seeking suitable candidates for the following positions:

SYSTEM CONSULTANTS up to £6.5K

Must have significant systems design experience coupled with an active involvement with a setes force in e pre-sales rols. They will conduct leasibility studies, prepere proposale end quotations for both tixed price and time and materials contracts and essist sales personnel in the presentation of these proposals. Similar experience will probably have been gained with a bureau, software house

PROJECT LEADERS up to £6K

olling projects through all implementation stages against time and financial. budgets, conducting progress meetings with clients, supervising training of users, and ensuring a smooth handover of projects.

ANALYST/PROGRAMMERS up to £5K

Must be able to take responsibility for the detailed design of systems, and essist with their implementation. Previous experience with on line applications would be useful.

PROGRAMMERS up to £4K

Musi have a minimum of 18 months practical experience geined in a formal programming environment and the ability to fit into an expanding team.

Contect BERNARD EDWARDS. Ext. 270.

The Company provides BUPA, Pension Scheme and professional residential training and career development programme: ON ANY OF THE ABOVE POSITIONS YOU CAN CONTACT PETER PEARCE (Recruitment Manager) DR HIS SECRETARY ANITA CAVALLER WHO CAN GIVE YOU MORE INFORMATION:



Ring: 01-637 1355 or write to Network Services Limited: 179-193 Great Portland Street, London W1N 5118.

The state of the s

WARRANCE THE WALL BALL LA MINISTER CO. 1997.

CHALLENGING MINI-COMPUTER DEVELOPMENT

(Overseas Relocation Opportunities)

SURREY

Circa £6,500

Our client's International Division is commencing a major prestigious project developing specialised commercial applications using COMMUNICATIONS and DATAMANAGEMENT techniques, utilising their latest range of mini equipment.

The new team being formed is to include:-

SENIOR PROGRAMMER/ANALYST

Your challenge will be to

- * Motivate and lead a small team of programmers.
- * Monitor team performance and schedule resources.
- ★ Liaise closely with the Systems Consultant in developing functional specs.

2 PROGRAMMERS

You will need to

- * Rise to the challenge of new techniques.
- * Develop and test real-time programs with a minimum of supervision.
- ★ Possess Assembler level experience.

Both levels require experience of Real-time Mlni applications. Equally, both represent exciting career opportunities as part of a Division with an envious reputation for developing impressive and advanced systems.

REF. 77/9/9

SPECIALIST COMPUTER RECRUITMENT LTD. BIRMINGHAM 021-236 3781 FREEPOST

Freepost, Equity and Law House, 35-37 Great Charles Street Ougensway, Birmingham B3 2BR

MANCHESTER 061-833 0676 FREEPOST

freepost, Com Exchange Buildings, Corporation Street, Manchester M4 8BD

LONDON 01-935 0671 FREEPOST 6 Freepost 6, 102, Blandford Streat, London WIE 1JZ



△ Ata Hintons

We are a public company involved in retailing in the North Eest of England operating over 50 outlets in

We have recently upgraded our computer to a a3700 300K0 with 129m characters of LAK disc and the usual other paripherate.

Now we ere embarking on extensive redesign of many of our systems end have vacancies for the

Systems Analyst

With e sound commercial and programming background, must be able to communicate with all levels of management.

Programmers

Multi-progremming experience would be helpful but

Attrective aelaries will be ollared to the right pplicante and bonus achemes ere in operation

Applications, giving deteils of career to deta and when available for personal Interview, to

Mrs. S. K. List Personnal Managar AMOS HINTON & SONS LIMITEO P.O. Sox 24, Master Road THORNABY, Claveland

COMPUTER PROGRAMMER

required to essist with the research programme of the stellarter group at the Cutham Laboratory. The principal activity will be to develop new programmes or modify those written for other physical situations to model plasms between in stellarter geometry, and to assist with software for, data acquisition and processing. Supervision will be provided by Dr. A: N. Franklin but the person appointed would work mainly at Cutham.

Applications are trivited from graduates (mathematics, physics or engineering), with experience in programming and numerical analysis. Salary according to age and experience on the Research Support Scale. IA (5333-65627 per annum). The appointment would be far three

years' fixed term.

Applications to the Administrator, Department of Engineering Science, Perks Road, Oxford, by 20th September, 1877.

AMERICA - EAST COAST

SALES EXECUTIVES **ANALYST PROGRAMMING** SUPPORT STAFF

The Company is a well known international supplier of computers, terminals and general business systems.

They will make new eppointmente for sales end support stall to complement a vigorous and axciting plan. Vacencies are at a number of the company's East Coast

The positione offer above everage incomes and moving exponses will be considered. A minimum of a two year contract of amployment is envisoged and a positive career progression beend on success can be expected.

Applicants should have experience of seles or support in terminals and systems, which might include DATAPOINT, SINGER 1500, SAUNDERS or Mini Computers such as BURROUGHS, NCR and ICL.

For further information, places contect immadiately the advising consultant, quotang



inaight Merketing & Personnol 72-75 Marylebone High Street London W1M 4AJ Telephone: 01-488 5644

METROPOLITAN BOROUGH OF KNOWSLEY Computer Section, Depot Road, Kirby COMPUTER

PROGRAMMER

PROGRAMMER
AP 3/4 £2822-£3702 + £312
8 Phase 2 Supplement
He or she will be involved in the
maintenence of existing linencest
explications and with a development of further linenciet systems.
The instellation comprises en
I.C.L. 1801T Computer with
communications devices. Both
Plan and Cobol Languages are
used."

Preference : will be given to qualified applicable with at least two years experience.

Ring 051-549 8555 or write to the Personnel Officer, Municipal Sulldings, Civic Centre, Kirby, Liverpool 1.32, 17% (ar. en. epolication flore).

application long. Closing dele Bith September, 1977

DUNDEE COLLEGE OF EDUCATION

ANALYST/PROGRAMMERS

Applications are invited from suitably experienced persons for two naw posts in the Computer Centre, which is responsible for all computer services in the college. There are interesting opportunities in systems programming, and scientific and commercial applications, including library automation, on a recently metalled DECsystem-20. Dutles will include an advisory service to users.

Salary on the scale up to £4,344 with possible tuture signaturement to a higher scale. Financial assistance towards the cost of removal expenses may be payable.

Further particulars and application forms may be obtained from the Administrative Assistant (Establishment). Dundes College of Technology. Ball Street. Dundes DD1 HG-to whom completed applications should be returned by 16 September.

SCHIGH WHYERE ANALYSIS SENIOR HESIGNERS

SPECIALIST/SI NIMII PROMHAM-

EU CAPITAL APPTS. EU

COMPUTER

SETIVICE

PROGRAMMEN For Publications Departs

August Underground St. A. Ming Sun Ut-1177 3021 for a hamadinta nupulaturunt PS Apprintmente, 101 Mitchen Lone, Landon, SW18.

apoli ecaponial about a select a select

SETIVICE:
ENGINEERS
From for from join list all
eleas
SALAMES TO FOOD Applications giving as a seriory, qualifications as a once, together with res for not Mr. R. Happer, Well left 224 Great Periland Seek W. 1N SAA.

PROGRAMMER

IBM 360/370

International organisation buying me dise for a major US retail group reprogrammer with minimum of experience, preferably on IBM 360/371 OS, for its London headquarters

We currently operate in both bank tarminel modes in en OS environment bureeu-based 370/158 system

This is an opportunity to join a stall teem in very pleasant Oxford Chous office.

Salary in range £3,500 £4,000 per excellent non-contributory benefit in ling BUPA, pansion, life assurance and the salary and

Edmund Howard's Client Album

HERTFORDSHIRE PROGRAMMERS SALARY C. £5.000

Experienced programmers are required to work in the Product Test department of our Client's Softwers Development Headquerters. Main responsibilities will include developing lests and conducting trials of newly developed softwers pulor to general release. The ability to write comprehensive reports and negotiate test objectives

Candidates should possess a practical approach to problem solving and an appreciation of the avantual users requirements which should raised in the completed product. Repid carear advancement is envisaged for those with relevent experience wishing to capitalise on their present experties. For further details please quote CW146

DEVELOPMENT **PROGRAMMERS**

HERTFORDSHIRE **SALARY UP TO £6,000**

One of the world's leading computer aquipment menufacturers is currently recruiting exparianced programmars to work on the devalopment of new products within their Europeen Software Development Group. Candidatas' experience should stem from a computer manufecturing background with a atrong bias towards assembly laval programming. A working knowledge of Disc basad systams plus soma communications axparienca would be a decided advantege.

This is a unique opportunity to join a rapidly expanding dapartment where you can develop your talants to the limit. Cerear prospects are excellent within the depertment. For further dateils please

SOFTWARE CONSULTANTS (1903 going to 2960)

ESSEX C. £6,000

A laeding menufecturer of precision engineering products is currently saaking a software specielist with at lasst five yaers' experience in systems progremming.

The person appointed will raport to the C.S.M. end be responsible for softwere avaluation, software plenning and meintanence end slso the treining of systems end programming steff in current softwars

The company hee plans to develop extensiva raef-time eystems for its commercial and manufacturing sclivitiae. An ICL 2960 will be instelled in a new computer suite towerds the end of 1978 to support thase davelopments end will utilise VME/B TPS 1900 end DME. Currant systems are besed on en ICL 1903A running under GII+

This is an Idael opportunity for someone who wents direct involvement in the softwere ectivities sssocieted with e large scale reel-time systam. For further deteils pleese quote CW150.

HERTFORDSHIRE TECHNICAL WRITERS SALARY UP TO £5.500

Firstly, there are one or two qualifying factors. The Organizations concerned to a manufacturer of intelligent terminate and computer peripherate who attornight believes that his biggest asset is the employee. This healthy working environment onables them to produce one of the linest products around, which

Our clant sets for people with the right personality to tackte and solve all manner of problems in close execution with the soltware design and product test teams, and with the enthuseam to meintain a high standard of documentation of every stage of their development projects. For further details please quote CW151.

Edmund Howard & Partners

Computer Personnel Consultants

5 Brighton Road, Surbition, Surrey, Telephone 01:399-9183. 38 Grafton Street, Dublin, Telephone 776,756.

Holland Nijmegen

Initial Contract which could lead to permanent

- * But without the living costs of the larger better known cities
- * A progressive ejert company with a DP unit committed to
- * Thara is frae tuition of the university longuage laboratory
- * A tively university fown near the German border
- * Ara looking for good staff who wish to live end work to Holland * Whare applicable, for both marriad and single staff a relocation ilowenca would be mada

Our cliants beliave that they have a lot to offer to the right people who are prepared not only to work for but to contribute to future devalopments of an unquastioned merket leeder. They require the following staff for both the DP unit and also e user department.

Programmers to FLS 35000 Programmer/Analyst to FLS 40000

If you have the following experiance and ere interested in these positions we would like to hear from you as soon ea possible

Strong COBOL background (some RPGII would be useful). Multi application background (preferably in manufacturing areas).

Our cliants will be conducting interviews in the UK within the next 14, days

Plaasa apply without delay to Gordon Cairns quoting reference no. C/690.



JOHN GOLDSMITH (Computer Services) Ltd.



We are retained to rectuit a fully qualified software expert who is ready to move into a Management role. The position is based in the Midfands with a mini manufacturer. We seek:

* Deep knowledge of PDP / 1 Software, aspecially RSX or RSTS

Experience of Deta Communication

Ability to motivate up to 10 statf
 Ability to work with clients and to support the marketing team

★ Negotieble salary in the region of £8,000 Cer or car ellowance

Opportunity to join a small managament taam Excollent cereer potential due to markat position of the company Assistance with relocation

For a confidential discussion, please apply to Pat Convey quoting reference CW20.

Our clients also require analysis and programming shalf for commercial developments. You should

★ Have two years commercial BASIC PLUS experience on any hardware

Wish to help develop advanced application software * Ba willing to work as prit of a jeans

* Potential for career development with advanced systems

* Expenence of a wide variety of commercial applications Opportunity of direct involvement with customers

For a confidential discussion, please apply to Pat Convoy quantity ruleipness CW 20



COMPUTER PERSONNEL CONSULTANTS, 021-632 6848 (24-hr. service)

The Rotunda, New Street, Birmingham B2 4PA

We offer career counselling for computer professionals — Contect us for a confidential discussion

AN URGENT MESSAGE TO FREELANCE PROGRAMMERS AND ANALYST/ **PROGRAMMERS**

A major firm of consultants is looking for people who want something more than the

£200

weekly wa pey cur fraelancere

For example:

- ★ Long-term projects
- ★ Security of continuing assignments
- ★ Development projects
- * Paid holidays, etc.

If you have any of the following experience we need to hear from you now, for projects throughout the **United Kingdom and Europe:**

Commercial systems IBM BAL

Commercial systems IMS PL/1 or COBOL

Message switching applications DEC PDP/11 BASIC or CORAL

South Eastern Computer Services South Eastern House

3/5 Old Bridge Street **Hampton Wick, Kingston-upon-Thames** Surrey KT1 4DB

Telephone: 01-977 5321

Computer **Programmers**

We are looking for experienced Programmars to join an anthusiastic team who are currently involved in writing lerge complex data basa systams.

Applicants should heve reached an educational standard of not. less than GCE 'A' level in two subjects, one of which should be mathemetics. Preference will be given to man or women who have e working knowledge of IMS DB/DC DL/1 and COBOL lenguage, Present hardware configuration comprises IBM 370/135, and 158.

For further details of the salary range and benefits, please write to or telephone

Norms Smith, Personnal Officer, Rolls Royce Limited, (Aero Division) P.O. Box 17, Perkside, Coventry CV1 2LZ. Tel: Coventry 27666

ROLLS ROYCE LIMITED Aero Division

ON-LINE CAREERS

CIRCA £5,000

processing investments, who ere developing — et their Essex Centre — e wide range of finencial and production applications will shortly involve:—

- * On-line end Reel-time development.
- ★ Dete bese techniques.
 ★ fnitielly based on e System 3/15.

Opportunities now exist for:

2 PROGRAMMER/ANALYSTS

Bright, embitious with COBOL or RPG ff experience end the ability to rise to the challenge of

These represent significant cereer development opportunities to those who enjoy a flexible project teem role and wish to gein Tele-Processing and Database expertise.

Seared in a very attractive part of the countryside, with low cost housing, they after full relocation expenses, a bonus scheme and uther large company benefits. CONTACT LONDON OFFICE: 01-935 0671

SPECIALIST COMPUTER RECRUITMENT LTD.

BIRMINGHAM 021-236 3781 FREEPOST
Freepost, Equity and Law House, 35-37 Great Charles Street Queensway, Birmingham B3 2BR

MANCHESTER 061-833 0676 FREEPOST Freepost, Corn Exchange Buildings, Corporation Street, Manchester M48BD

LONDON 01-935 0671 FREEPOST 6
Freepost 6, 102, Blandford Street, London WIE 1 JZ

Computing Services
Association



COMPUTER OPERATORS

Commencing Salery (including Shift Allowence) up to c£3,B50 per annum.

We are seeking eddillonel staff with at leeel 18 months' experience of George 3 end/or OS/VS1 on conligurations almilar to our own.

Our equipment includes an ICL 1904S run using George 3 end MOP, en ICL 1904S run using George 2 end Meximop, en IBM 370/145 run under OS/VS1 (to be replaced by a 370/148 by the end of The year) and 2 2903a.

Valuable fringe benelite including FREE TRAVEL FACILITIES on London Trensport services,

f you ere interested end would like further information please telephone the Senior Operations Supervisor on 01-637 9144 or write to Staff Appointments and Development Officer (Ref. 851/C), London Transport, 55 Broadway, London

C LONDON TRANSPORT

CONTRACT

High Income Contracts through RTZ Compuler Senior Graduetee end experienced personnel required with knowledge of financial systems, interactive or datables

■Languages COBOL, PL/I, FORTRAN, BASIC of Assembler level.

Minf or main frame experience required.

Contracts for Operators, Progremmers and Analysis

RTZ Computer Services Limited. 18/19 Sandland Street, London, WCIR 4PZ

01-4059964



The unit will reed ABA, IAIA or IAIAI atrip on magnetically encoded carda with o pass-through action. A spaciel megnetic head and a self-contained electronic peckaga will provide standard CMDS or TTL outputs in the Integral punch/read

on 30 chps terminal FROM Data Dynamics is a 30 equipment combination on the ches microcomputer controlled market.

The ZIP 30, which is also TY" keyboard while UK moriels ed to be the first with available in KSR and RO

From Tekdeta is a US-mada manually opareted

megnatic strip card reader that it has introduced into the UK. Named Model 40, it to

intended for tow-coat cepture of deta from stand-sions peripharaia and to pictured abova.

The unit will reed ABA, IATA or THRIFT

integral paper-tspo punching ond reading facilities.

Called the ZIP 30, the ASR ASCII characters in the form of terninal is boilt by the Dato a 5 x 7 dot matrix. Lower case is Dynamics subsidiary in France, Peofcric SARL coptionsi. An original and up to three copies can be printed.

Peoferic SARL.

Data Dynamics quotes e one off poce for the ZIP 30 of about that the ZIP 30 is o direct plug t1.800 which the firm claims to be considerably less than the price of any other comparable roll paper.

Low frequency data digitiser

PRODUCT ROTES

A COMPACT unit that can collect, digitise, and store low frequency data on a 3M cartridge type is now ovallable from Gould Advance.

Called the Goold 8100 data acquisition system, it can scan multiple analogue largest at the interpretation of the collect of the type IBM supply for its own machines and is thought to be the only one on the UK multiple at one of the UK multiple at o

acquisition system, Il can scan multiple analogue Inputs at rates from 200 channels per The 8100 can be controlled from telephone or telemetry links using the Qould Communications interface option end is completely requipped for remote control vie logic levels econd to one scan every 10

ninutes. The 6100 weighs 18 Kg and

Controller

TWO single board disc control-lers for Date General and Digital Computer Controls Digital Computer Controls minicomputers are now available from the Bytronix Corp of Callfornia.

The model B234 controller is software and media compatible with the DG234 compatible with the DG234 compatible Sisteman Road, Bishop's Stortford (0278)

The model B234 controller is software and media campatible with the DG4234 disc system. Tell Bishop's Stortford (0278) 55155.

Dust control of the compoler chassis. The Model 446 is software, media and pin compatible with the DCC 11644g disc system and will control one or two drives. Will control one or two drives.

Bytranix Corp (CW), 2751

from a lightweight, non-woven vinyl which has low static East Chapman Ave., Fullerton, properties and is flame-Cellfornia 82831, USA. Tel. resistent.

Tag reader

come with a "QWERTY keyboard. Data Dynamics Group Lid

(CW), Date House, Springfield Road, Hayes, Middlesex. Tel: 01-848 9781.

Ribbon

form of e deta stream and o strobs.

The Model 40 utilises a heed that gimble-mounted and individually suspended

DATARIBBON, the printer ribbon division of Dainproducts International, is to introduce into the UK a agreew ribbon and a cossette ribbon. The ilbbons will fit DEC

writers, Centrunic printers and CDC normw ribbon printers. The cassette is designed us nu

duced a ribbon designed to operate on the ICL 1033 printer инну. Dninribbon luternotional

(CW), Sterling House, 3t-3g South Street, Reading, RGI 4QT, Tel: 0734 585723.

to the manufacturer. The Consultancy

THE Watford, Herts firm of Langley Metal Products is now offering e consultency service

Langley Metal Products Ltd (CW), Unil 4A, Lyon Industrial Estate, Hartspring Lane, Walford, WD2 8JU. Tal: Watford (92) 48327.

A HAND-HELO department store tag reader, the NCR 7876. It is a pisto-shaped device and is presently competible.

backing.

This traps the dirt and dust which can be removed via a suction cleaner, shaking or washing the mat.

3M added that the Nomad trains.

Portable data logger

logger designed to record data from Texas Instruments Silent 700 terminals is now evallable from Christic Electronics of Stroud, Gloucestershire, Chiled the CDL100/S700 it is a

data to Silent 700 standard from up to 100 channels and comes with interfacing and signal conditioning facilities for a wide range of input types, according to Christle. These include analogue, pulse, coun-ter, parallel digital and chan-

gimbla-mounted and individually susponded in e yoke by parollelogram springs, said Tekdata. This assembly will provide precise head gap to card contact and thus minimising apacing losses and bit drop-out when cards are Tunstell, Stoke on Trent, ST5 4PA. Tel: 0782 B11711.

Magnetic

A RANGE of magnetic tape cassette units, the CS Series, hos been Introduced by Digital Peripherals of Poinswick, Gloucestershire. The range includes

software, odding that conver-sion to the Texas Instruments

for customers requiring tallor-mado cebinets and racks.

It has a porous construction of colled loops that are permenently fused togather on a foam (Stationers) Ltd announce a It has a porous construction

bas been introduced by NCR.
It is a platod-alraped device, and is presently compatible with the NCR 280 and 250 iretailly formulate, although it conjunction with dust conjunction with dust conjunction with dust conjunction with dust conjunction with a locked-in ink supply conjunction with a locked-in ink supply conjunction with a locked-in ink supply conjunction with dust conjunction with a locked-in ink supply conjunction with a locked-in ink supply conjunction with a locked-in ink impregnated, plastic make the normal tecky met work more efficiently.

This produces rapid, uniform and or of the features include a sensitivity of 10 millivolta, automated of the errors made oliminates meny key operators.

Prices for the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start at 1936.

NCR Ltd (CW), 266 Maryle on the 7867 start a

development of the existing Christle CDL100 logger. The CDL100/S700 can record

The COLIOD/S700 comes

meine power pack end en environmentally proofed enclosure and weighs 11 Kg (24 lbs). Sultable operating envi-ronments listed by Christie Include leboratories, power stotions, production lines, traffic and environmental study oreas, oil rigs and ships.

cassettes

read only, write only and read/write versions that are oil based on the Fnclt 4204 cassette

nre plug compatible with all forms of paper lape punch/reoder, will read or record to ISO 3407/ECMA 34 standard at

speeds up to 560 chps.
Digital Peripherals says that the CS units are completely autonomous and require no change to a lost computer's achieved by the operation of a

Plug In Interfoces offered with the CS Series include 8-bit purallel, RS 232 voltage, RS 232 20mA toop, Fncit Universal and Facit SPI.

Other CS Series features include nutomatic error correction and control focilities as alandard. Recorded date is validated by block length checks, drop in/drop out detection there there

tion, timing error detection and cyclic redundancy tests.
Digital Peripherals Ltd (CW),
Cheltenham Road, Painswick,
Gloucestershire, GL6 6TS, Tsi:
Gioueesler (0452) E12688.

Diagnostic

can be tested actively end passively with the Digitech Pacer, a portable diagnostic unit from Aspen Electronics 'acer, a portable diagnostic mit from Aspen Electronics Ltd of Eastcota, Middlesex:

As a monitor the Pacer can at a a monitor the Pacer can at a lone instrumenta or sequences, aelectively search and retrieve, and record control

lead along with data so that omplex probleme cen bs pressed, fully eutomatic frei form losted rapidly.

In active mode Pacer can test Hertz up to the maximum range model. terminals, aoftware, modems, of either 15 or 80 MHertz is VF lines and the CPU by obtained without oparator simulating OTE or DCE, ac intervention.



A portable alerm that can be fitted to doors and windows has been introduced by Fensdek of Harborne, Birminghem. It can be activated by a quick release chain and massures $6 \% \times 2 \% \times 1$ inchas. It is of solid state construction and is bottary

The prica for the door unit (illustrated above) is £13.75.
Models with protection for up to five points, including windows, are £14.50 sech plus window points at £2.95 per pair. Names of local stockists are svollebis from Fonadek.
Fonadek Ltd (CW), Albany Road, Harboma, Birmingham, B17 9JB. Tel: 021-427 2267.

CMTISTIC Electronics Ltd (CW), PO Box 18, Stroud, Gloucestershire, GL5 INE. Tel: Stroud (04E 3E) 77506. Ring binder for **DP** stationery

binders for computer stallonery has niways been a complex problem. Small size (% Inch) marginal sprocket holes dictate the use of fine gauge wires for

The shoer bulk of multi-page print-outs necessitates large FROM Lamson Primgon Is a rings. Therefore conventional reasunable enpacity never work for long because the flimsy business forms, plus a separate copy for control purposes.

Known as Specificaller.

Jetleys (Great Britain) has claimed to have solved this more complex constructions incorporating additional parts problem after 18 months deveopment work, its solution is enstomer's specifications. that is based upon a potented screw thread fitting instead of copy is selectively reproduce

the traditional apring rings.
At its heart is a screw mechanism silm enough to pass the sprocket holes with ease and toking o 21-inch wad of This is about three times the

cupacity of an old-siyle nominal one inch ring binder and is held in pince, without tearing, by a machines or typewriters.

Counters

microprocessor-based systems to individual requirements is available from Mechtric Engin-TWO low cost eutoranging counters have been announced by Malden Electronica of eering. Servicea eveliable include Raynes Park and are believed to be the lowest costing auto-renging counters, of their frequency range, evallable enywhere in the world. system packing end etyling, electronic interfacing, special

hardware design and menufac-turing, systam essembly and testing, mechanical design, special panel making and MHertz and costs £150, Model 8847 costs £160 and covers up to 80 MHertz. Both counters ere designed to be used in the "hands-off" mode or as engraving.
Mechtric Engineering Ltd
(CW), 12 Brunel Road, Manor
Trading Estate, Benfleet, Essex,
SS7 4PS. Tel: Bouth Benfleet

cabinet making, electronic

Service

Deleaver

FROM Wilkes-Mulimatic is a forms handling machine for the smaller installation. Known as model WMD Mini-defeaver. It part sets and simultaneously

separates the forms.
It has most of the features of larger machines, according to Wilkes, including fully adjust able speed controls and takes up Intervention.
In-built pre-settable trigger fevel control and autometic range changing prevent over ranging and ensure the best resolution at all times.

UK release for 42 x 60 digitiser

inch digitiser is now available in the UK from Terminal Display

Called the ID 60, It is besed nn the littel 8080 inferoproces-sor and is the largest in the Summergraphics range, sold

of one least significant bit, the IO-E0 in evaluable OEM and to end-users. TOS added that firmware features for the calculating area and perimeter are offered and skew correction. scaling, mirroring, zooming windowing ond rotation as standard graphic monipulation

interfaces now eveliable include those for RS-232, TTY. Digital Equipment POP-11s, Data General Novas, Hewlett-Packard HP-9800 series colcuintors end the IBM 029 key

Terminal Disploy Systems Ltd, Hillside, Whitebirk Estate, Blackburn, BB1 5SN. Tel: 0254 252244.

Flooring

A MODULAR raised floor for computer rooms has been introduced by System Floors (UK). The new system incor-porates several features which (CW), 3-5 Astoria Monetons, Streathant High Rosd, London SW16 IPS. Tel: 01-277 3223. the company cloims are unique end which ensure the suitabl-lity of the floor for computer installations.

Positive location of the

moduing panels in to the support pedestols removes the danger of inovenient and cuables each panel in be removed and replaced without difficulty The underside and edges of the panels are encused in steel providing a high degree of fire protection while making the

panels strong enough to micel computer menufacturers' load 600 x 600 mm and are covered lu

System Floora (UK) Ltd (CW), Midlond Oek Trading Estnte, Marilsa Drive, Lythalla Lane, Coventry CV8 6HQ. Tel: 0203 061438.

The system is suitable for Paper binder

FROM Rexel is a paper blinder that can hold up to 25 sheets of paper punched with two holes et atandard eight centimetre

spacing.

Named Sta-Clip, it can be inserted or removed quickly A SERVICE to rollor mini and

> ond is light in weight. Sta-Clips ere auppiled in boxes of 100 for user convenience end mey be obtained from most etationery

> deteils of the overprinting ser Rexel Ltd (CW), Gatehouse Road, Aylesbury, Bucka, HP19 SDT. Tel: 0296 81421

INTRODUCING a thermo Designeted the Facit 4506, it is a lightwelght, compact

With heet-sensitive paper.
It has a full alpha-numaric capability within a 7×5 dol matrix and has a 14 column

apacity with print rate of 120

Facit-Addo Ltd (CW), Mold-stone Road, Rochester, Keni. Tel: Medway (9634) 401721.

Puzzle answer

THE key to the problem lies in finding the first two "moves". These are: I make a pair at one end of the row,